AVIATION WEEK

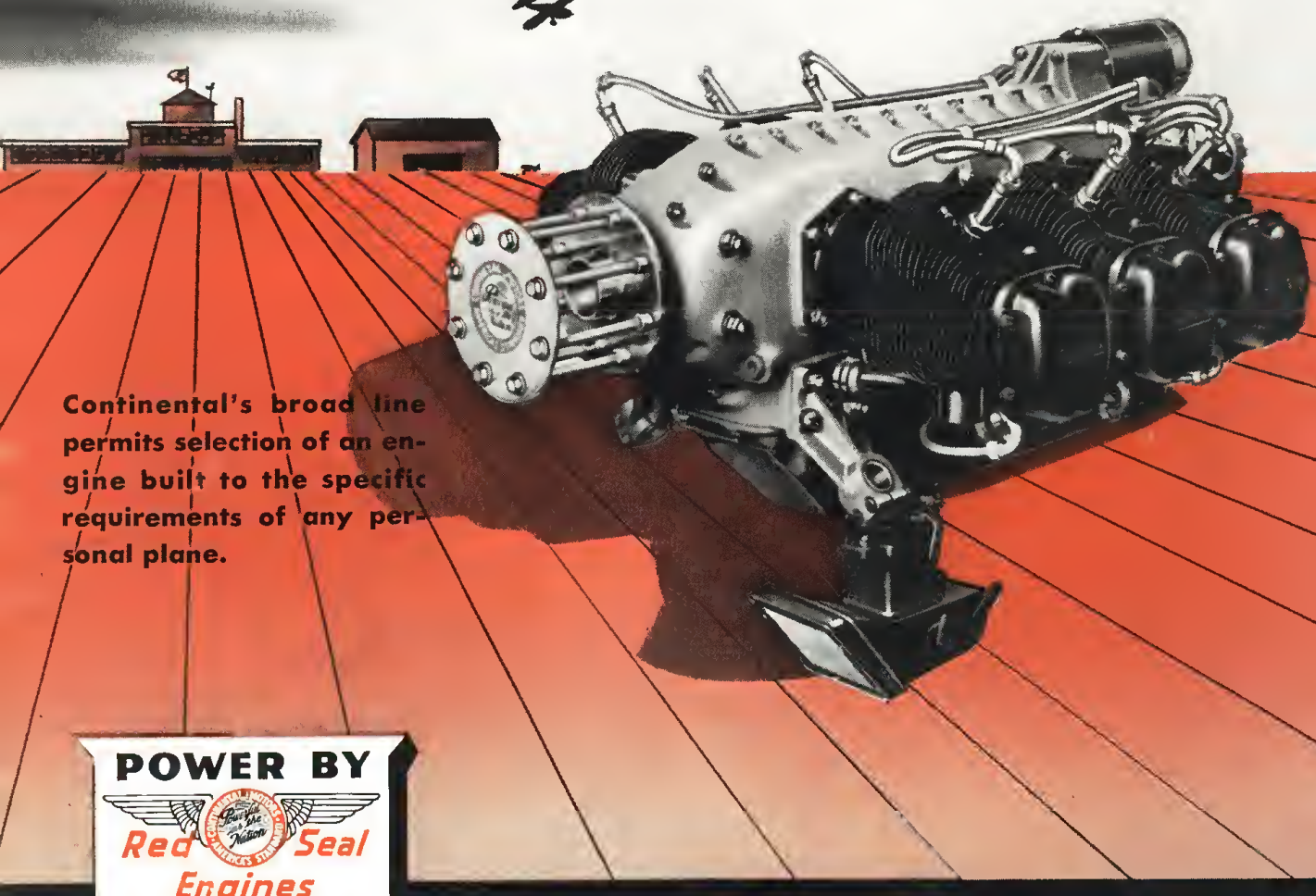
JULY 14, 1947

INCORPORATING AVIATION AND AVIATION NEWS

A McGRAW-HILL PUBLICATION

C-125

Six-cylinder smoothness with the favorable power-weight ratio of a "four".



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RADIO TRANSMITTER 184-A Provides maximum operation on 2 phone channels and 2 CW channels simultaneously, or 4 CW channels simultaneously, with choice of up to 4 different frequencies.

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UNITED AIR LINES

AMERICAN AIR LINES AA AMERICAN OVERSEAS AIR LINES

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Interchangeable-unit Canstructian gives a new high in versatility for ground-to-air and point-to-point communication

THE BIG AIRLINES, like TWA, United and American, know how important it is to meet the fast-changing needs of modern airport communication service, without obsolescence of costly equipment. And they've solved this problem with Federal's multi-channel ground station transmitters, 184A, 185A and 186A. For interchangeable RF units, power supplies and modulators make them adaptable to an almost unlimited combination of operating characteristics — for present needs and those of the future!

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INTERCHANGEABLE COMPONENTS permit wide selection of ratings and characteristics

Transmitter	RF Units	Power Supplies	Audio Amplifiers
184-A	1 to 4	1 or 2	1 or 2
185-A	1 to 6	1	1
186-A	1 or 2	1	1
RF Units*			
101-A	HF, 2 20 Mc—500 Watts, CW or Phone		
102 A	VHF, 108-140 Mc —200 Watts Phone		
103-A	LF 200-540 Kc,—400 Watts, CW or Phone		
Power Supply 125-A	Provides power for simultaneous operation of 2 RF units on CW or 1 RF Unit on CW and 1 RF Unit on Phone		
Audio Amplifier 136-A	Provides voice modulation of any one RF unit at full rated output		

*Each RF unit is independent of all others—HF, VHF, and LF can be used in the same transmitter if desired

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Heated boots for climbing ice

ICE on an airplane's cowl rings is a real threat to tail surfaces and controls. The ice builds up until the heat of the engine finally cracks it. Then, instead of slipping harmlessly off, chunks of ice *climb* in the propeller wash and are hurled at high speeds toward the tail. Sometimes these ice chunks seriously damage the tail and expensive maintenance is necessary.

To solve this problem, B. F. Goodrich has developed cowl boots of electrically heated rubber. They keep the cowls clean of ice and eliminate the penalty of increased drag and the hazard of flying ice.

Made of thin, tough rubber, the boot has wires imbedded in its core which distribute the heat uniformly over its entire surface. Tests, like the one shown above, check the carefully planned heat distribution. The heated rubber boot is very flexible, fitting tightly and smoothly to the cowl. It also can be internally installed where design permits.

Used to protect propellers, spinner domes, air intakes and other protrusions, as well as hydraulic lines, water tanks and similar installations, B. F. Goodrich heated rubber is the most efficient way of getting the right amount of heat to a specific spot. It can be adapted to any power supply. Research to make heated rubber even better is a constant project of B. F. Goodrich engineers. *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio*

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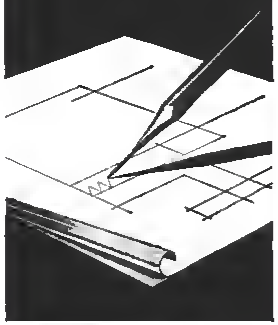

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AVIATION WEEK

Vol. 47 — No 2

INCORPORATING AVIATION AND AVIATION NEWS

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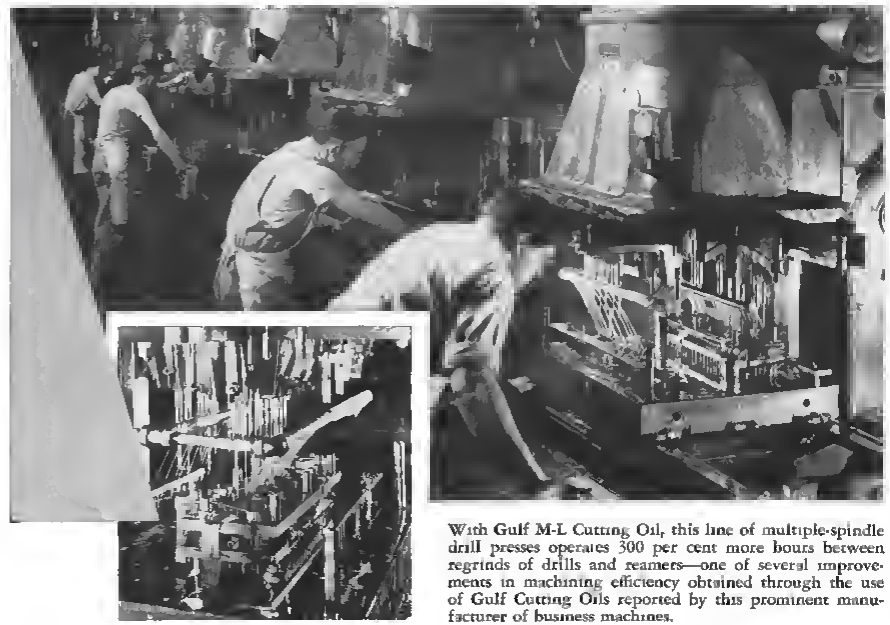
now with Gulf M-L Cutting Oil

every 80 hours!



With Gulf M-L Cutting Oil, this line of multiple-spindle drill presses operates 300 per cent more hours between regrinds of drills and reamers—one of several improvements in machining efficiency obtained through the use of Gulf Cutting Oils reported by this prominent manufacturer of business machines.

THIS IS ONE OF HUNDREDS OF SHOPS that report improved machining practice through the use of the proper Gulf Cutting Oil for each job!

Gulf quality cutting oils can help your machines gain an edge in efficiency—mighty important for the period of keen competition just ahead! Here's the important reason: Every Gulf Cutting Oil has specific properties which insure better performance on certain types of jobs.

Call in a Gulf Lubrication Engineer today and let him show you how Gulf Cutting Oils can help you increase production and tool life and get better finishes. Write, wire, or phone your nearest Gulf office.

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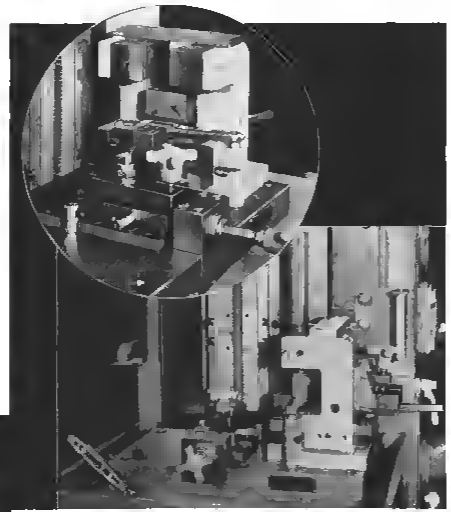
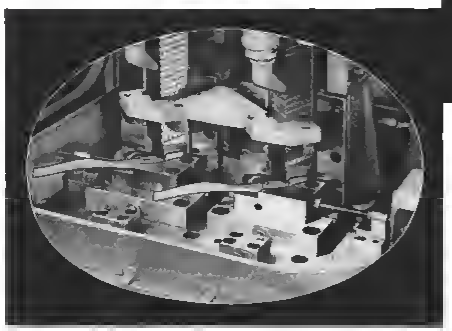
American

THE ONE SOURCE FOR *ALL* YOUR BROACHING NEEDS

One of the most important elements of any broaching job is the work holding fixture. To successfully obtain top production the fixture must be easily operated, solid in construction, and hold the work rigidly in position during the broaching stroke. *American* fixture engineers are skilled in the design of automatic and semi-automatic fixtures for high production, and manually operated fixtures when economy is a foremost factor.

For better broaching *American* builds the following complete line of broaching machines: Single Ram, Duplex Ram, Universal Type 3-way, Vertical Internal Pull-up, Horizontal, and Rotary. All sizes and types of broaches are also available, as well as Pull and Push Heads from *American*, as your one source of broaching needs.





(Above)—A simplified manually operated two station fixture to produce two sewing machine parts to close limits. A cast iron Slide Block is straddle broached at the left hand station, a slot in a malleable iron Main Connection part is surface broached at the right hand station. Parts are clamped manually, and floating jacks, also manually operated, are provided to prevent springing of the Main Connection part. Exceptionally fine finish is obtained on both parts which interlock in the final sewing machine mechanism.

(Above)—This *American* designed fixture for broaching the jaw teeth of plier halves consists of two work stations. Separate work locators are supplied for each type of plier half. Parts are automatically clamped and unclamped by means of an air cylinder. Location is taken from the previously drilled hole in the forged steel part. Production of plier halves is increased considerably over the previous machining method.

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Complete specifications for pull and push heads are contained in an attractive 8-page circular. Complete assortment of types and styles for every broaching tool. Write for "Broach Pull and Push Head Circular" No obligation.

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BROACHING MACHINES
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THE AVIATION WEEK

CAUTIOUS OPTIMISM—From deep pessimism a few weeks ago the military aircraft manufacturers have swung to cautious optimism. Reason: The startling new attitude in the Senate toward Army and Navy appropriations requests. Although both bills were still being enacted last week at press time, industry was cheered because the Senate had added $78,000,000 in contract authorization for Navy planes, and $203,490,000 in authorization for the AAF. That meant AAF could buy 1,100 new aircraft—if both Houses agree.

HOW POTENT IS THE LEGION?—How much credit for the apparent switch in Congressional sentiment can go to the American Legion was an interesting question. Since last spring, Aircraft Industries Association has been cooperating with the Legion on a program of public enlightenment. Idea was that the Legion, one of the largest organized citizens' bodies, could carry the message of the hazards of a crippled air fleet to the grassroots in the hope it would filter up to Congress. That may have been a successful approach. At any rate, some aviation leaders who have always shied from any public campaign, believed they saw important possibilities in the device.

MORE BUCK ROGERS PLANES—Increased aircraft procurement funds plus unexpected rapid progress in NACA high-speed research spells new AAF combat types with low aspect ratio wings, swept wings and tails. If funds are restored, look for a fistful of new AAF transonic types—drawings are already complete—to fly this year. Combat designs may outstrip new research aircraft in performance before the elaborate flight research program has reached the half-way mark.

AIRLINES BREWING BARGAINS — Moves by Chicago & Southern in lowering fares 15% on midweek roundtrips and by Capital Airlines in combining with a steamship line to offer packaged air water vacations on credit are just the beginning of promotional plans to fill seats. Watch for the airlines to make a deal with Hertz Drivurself System in agreements providing for convenient rental of cars by plane passengers.

FORWARDERS & CARRIERS FEUDIN'—Feud between airfreight forwarders and certificated airlines is moving into the open. Forwarders intend to ask CAB to throw out the airlines' new consolidated tariff, which is so constructed that indirect carriers cannot make a profit by combining small shipments into larger lots for a lower rate.

MONOPOLISTS ARE CAGEY—Attempts will be made to force proponents of chosen instrument legislation into a showdown on the issue. Now that it is apparent the proposition would be defeated soundly in both House and Senate Interstate & Foreign Commerce Committees, Chairman Brewster (Senate) and Chairman Wolverton (House) are scheming to avert a vote. If successful, they would leave the proposal in suspended animation for reactivation at any opportune time in the future. Rep. Priest, strong opponent of monopoly, will try for a showdown vote at a coming session of the House group. One attempt by Sen. Ed Johnson to inveigle a vote in his Senate Interstate aviation subcommittee failed. Brewster insisted there was no point in voting on the matter as long as it was plain that it would not be cleared for floor action. Johnson will try again. Standing record in Congress for the chosen instrument remains its 10-10 tie vote when it missed clearance by the Senate committee for floor action in 1945.

TWA RESHUFFLES—Widespread personnel changes announced by TWA are merely another installment in a long term reorganization. John Collings, executive vice president, is running the show, reporting direct to President Cohu. More big moves are in the works.

LIGHTPLANE COMPANY STOCKS—Responsible lightplane people are worried by possibility of public losses in small, new, poorly-financed "manufacturers." Last week Dansaire Corp., Dansville, N. Y., and president George C. White, Jr., were permanently enjoined by New York Supreme Court from sale of company securities in the state, on petition of the state Attorney General. Firm had developed an experimental 3-place personal craft, the Dansaire Coupe, but had not produced it in quantity.

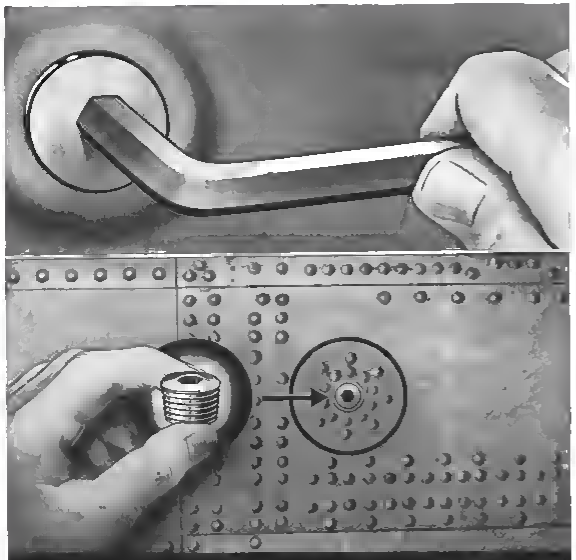
WASHINGTON OBSERVERS PREDICT:

► Some delay and Senate debate on appointment of Assistant Secretary of Commerce W. A. M. Burden's successor seems certain. Appointment carries with it direction of CAA, Coast & Geodetic Survey and Weather Bureau, and membership on Air Coordinating Committee and NACA. The appointee is expected to undergo grilling on his knowledge and technical qualifications in these fields.

► Both AAF and Navy will swing to UHF air communications facilities replacing VHF, on which CAA and airlines are standardizing.

► President's special air safety board will recess soon and resume in the fall. Long agenda still remains.

► As result of speedy pace set by Truman Board, a renewed drive is likely for an independent air safety board at next session of Congress. ALPA will spark it.

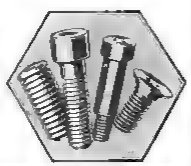


ALLEN HEX-SOCKET PIPE PLUGS

From crankcases to sea-wings, in oil lines and hydraulic fluid lines, these plugs have provided the perfect seal since the infant days of aircraft. They prevent leakage where safety *depends upon it.* The extra Allen HOLDING POWER prevents loosening under vibration.

This plug has all the strong-points of Allen Hex-Socket Screws. Cold-drawn of special-analysis *ALLENOY* steel (standard), also available in duralumin, bronze, brass, stainless steel and other metals. Lead screw threaded to close tolerances, scientifically heat-treated for *balanced* hardness and toughness.

In the plants that make the planes, Allen strength and precision are incorporated in a multitude of machines and machine tools, by use of the hex-socket screws shown at right. The line is *complete* in extra-dependable fastenings for all manner of assemblies.



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NEWS DIGEST

DOMESTIC

Glenn L. Martin Co.'s Model 303, pressurized sister ship of the 202, made its first flight.

Consolidated Vultee's Model 240 has begun CAA certification tests and by last week was about one third through.

National Science Foundation Bill, including a clause providing that the director be appointed by the foundation instead of by the president, was approved by House Interstate and Foreign Commerce Committee.

Firestone Aircraft Co. will license other aircraft and accessory manufacturers to make its aviation products, and will increase concentration on expansion of its aircraft and accessory distribution at airports.

Larry Cates, formerly of TWA and librarian of the House of Representatives, is new Washington Representative of Air Line Pilots Association, succeeding John Dickerman, resigned.

Northrop Aircraft, Inc., has received $10,000 contract from CAA for design of a cross-wind landing gear for its tri-motor Pioneer. This is seventh and last of CAA's castering gear development contracts. Goodyear has been granted a $51,800 contract for castering gear on a DC-3, and Bellanca a $5,650 job for gear on its four-place Cruisair.

Al Cline was appointed public relations director of Northrop Aircraft to succeed Dale Armstrong, who resigned to direct TWA public relations. Cline has been assistant public relations director for Northrop for three years.

Ernest R. Breech resigned as a member of the board of directors of North American Aviation, Inc.

Stanley R. Shatto has been named Vice-President Maintenance and Engineering of Western Air Lines to succeed William Maxfield who resigned. Shatto held the same position with Continental Air Lines.

United Air Lines reports revenue passenger miles increased 19 percent during first six months of 1947, over same period last year. Cargo gained 102 percent, while mail dropped 15 percent.

FOREIGN

Society of British Aircraft Constructors has re-elected W. R. Verdon Smith as president for the 1947-48 year. Vice President is Sir Roy H. Dobson, managing director of A. V. Roe and Co.

Ceylon Council has sanctioned inauguration of state air service between Colombo and India.

British European Airways plans to start air taxi service with helicopters next spring.

Armstrong Whitworth's AW-55, 28-passenger feederliner, has been renamed the Apollo. Original designation was Avon.

EVERY MAJOR AIRCRAFT ENGINE MANUFACTURER SPECIFIES

BENDIX-SCINTILLA

IGNITION EQUIPMENT

On all types of aircraft the Bendix-Scintilla* reputation for engineering excellence and manufacturing precision is reproven daily by a variety of ignition products.

The entire family of Bendix-Scintilla products—electrical connectors, aircraft coils, wiring harness, radio filters and other ignition equipment—delivers the same high degree of performance that has made Bendix-Scintilla Magnetos the standard of the industry.

Follow the example of leading engine manufacturers and airlines—specify Bendix-Scintilla ignition equipment!

*TRADE MARK

SCINTILLA MAGNETO DIVISION of
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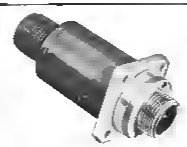
Bendix Aviation Corporation

Bendix Scintilla Radio Interference Filters are designed for insertion in aircraft ignition grounding circuits. Extremely successful in eliminating radio noise at very high frequencies.



Bendix Scintilla builds both high tension and low tension aircraft ignition systems. The newly developed low tension systems are designed for extra efficiency especially at high altitudes.

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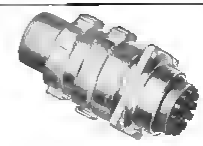
Bendix Scintilla is also a leader in the field of Diesel Fuel Injection Equipment and is in wide use on railroad, marine and stationary Diesel engines.



Bendix-Scintilla Electrical Connectors are built in a wide variety of sizes and types. Precision-designed to give a pressure tight, water tight and radio-quiet assembly, they are performance-proved by thousands of installations.

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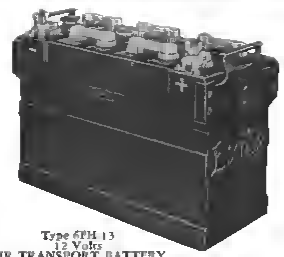
AIRCRAFT BATTERIES

USED IN MORE PLANES...COMMERCIAL, GOVERNMENT AND PERSONAL... THAN ANY OTHER MAKE OF BATTERY

Exide Aircraft Batteries embody the most advanced engineering developments. Their extra power and rugged construction assure safe, dependable performance and a long life with low maintenance costs. And you can count on Exide Aircraft Batteries for maximum performance per pound of weight.

There are Exide Aircraft Batteries for planes of every kind.

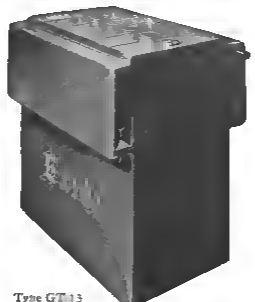


Type 6FM 13
12 Volts
AIR TRANSPORT BATTERY
Used by leading airlines

Type 6TS9 F
12 Volts
PERSONAL PLANE BATTERY
For lights, radio and starting

Type 3AC 7
6 Volts
LIGHT PERSONAL PLANE BATTERY
For ignition and small lighting loads

Type 12TS 9L
24 Volts
MILITARY TYPE BATTERY
For converted Government planes



Type GT 13
12 Volts
ADVANCED TYPE BATTERY
Used in jet propelled planes

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

VOLUME 47 • NUMBER 2 **AVIATION WEEK** JULY 14, 1947

INCORPORATING AVIATION AND AVIATION NEWS

Largest AAF Helicopter Flies; Points to Commercial Trend

Kellett XR-10, designed to carry 10 passengers or 2,000 lb. cargo load, successful on initial flight tests; has 350 mile range.

By ALEXANDER McSURELY

A sturdy, all-metal 12-place Army helicopter capable of hovering at 6,000 ft altitude, climbing to 15,800 ft or travelling forward at a top speed of 121 mph at sea level has passed its first flight tests successfully at Kellett Aviation Corp., North Wales, Pa.

The Kellett XR-10, as an ambulance, will carry six litter patients and is fitted with a hatch in the fuselage, 33 by 52 in., and a hoist, to load litter patients, personnel or cargo while hovering over an otherwise inaccessible spot.

▶**Twin Engines**—Two Continental engines (Model R-975-45) of 525 hp each, turn the twin 65 ft. diameter intermeshing rotors of the XR-10, making it the most powerful helicopter now flying and one of the two largest rotary wing aircraft.

McDonnell Aircraft's Navy helicopter XHJD-1, with two 450 hp Pratt & Whitney Wasp Jr. engines turning 46 ft. rotors, will carry an equivalent load of 10 passengers plus crew of two, while the only other helicopter near the same size known to be flying, the Piasecki XHRP-1, has one 600 hp Pratt & Whitney R-1340 engine which turns two 36 ft. diameter rotors.

Impact of the XR-10 will probably be greater in the field of commercial helicopter operations than as a military vehicle, although its 350 mile range at 90 mph cruising speed and its ton of payload make it worthy of serious consideration in both fields.

▶**Early Solution**—Three large experimental helicopters, by as many companies, are flying, indicating likelihood of early technical solution of many problems. Of the three, the Kellett looks most like a conventional airplane, with its all-metal fuselage, external nacelles, and tricycle landing gear.

Appearance may be more important than designers think, in selling a new means of transportation. Analysts generally agree that the helicopter will begin to come into its own economically only when it is large enough to haul a number of paying passengers. The Kellett, from appearance and performance, is approaching that point. It is closer from appearance standpoint at least than its contemporaries at McDonnell and Piasecki, both of which are flying prototypes, built to try out new designs. The XR-10 is more of a production aircraft design and is the second of its configuration built by Kellett.

▶**Egg-Beater Rotor**—Its "egg-beater" rotor system of six intermeshing synchronized blades turning in counter rotation from two hubs mounted close together on a common platform atop the fuselage has been tested already on the Kellett XR-8, a two-place copter designed by Richard Prewitt at the time vice president of engineering and principally responsible also for the XR-10 design. Synchronization of the intermeshing blades is maintained by a system of gearing developed by Prewitt from the original German Flettner intermeshing rotor helicopter design. Three of the XR-8s were built and flown for many hours to demonstrate the principle.

Successful performance of the Kellett XR-10 in further flight tests may bring prospects for commercial orders to Kellett. The XR-10 has been designed with commercial possibilities in view, as is customary with virtually every military transport aircraft. A year ago, Kellett was inviting air transport companies to view two mockups of the XR-10 in a commercial version known as the KH-2, for 10 passengers and crew of two, and a cargo version carrying a ton of freight.

The company became over extended financially and was forced to withdraw from all but its military commitments in the heli-

KELLETT'S NEW 12-PLACE HELICOPTER

copter field But the picture has not changed in the last year as far as availability of 12 place helicopters is concerned Only two helicopters have received commercial licenses from CAA, the two place Bell 47 and the four place Sikorsky S-51 An all-metal production version of the McDonnell helicopter could be a strong competitor but there appears no immediate prospect for such an aircraft

The XR 10 drives its rotors by shafts which extend up from the engine nacelles alongside the fuselage to the rotor heads, shown exposed in recent test photos, but designed for fairing coverings

Either engine will turn both rotors The helicopter will fly with a single engine, assuring a safety margin, in event of one engine failing, which has been offered in helicopters only by the XHJD 1

Service ceiling of the XR 10 is estimated at 18,800 ft, less than 1,000 ft below the international helicopter altitude record of 19,167 ft set by Maj E M Cassell, AAF, Feb 10 at Patterson Field Dayton, in a Sikorsky R-5-A. Since the service ceiling is not absolute ceiling, it is porrible that the army may attempt to better the record

Other XR 10 specifications Rate of climb, 1,650 ft./min, disc loading, 2 96 lb /sq ft, power loading 10 74 lb /hp, rotor blade area, 290 sq ft, disc area, 3,710 sq ft, design gross weight, 10 997 lb., weight empty, 8,204 lb, useful load, 2,793 lb, fuel capacity, 180 gal., hovering ceiling 6,000 ft

Comparison of the three luge twin rotor helicopters inherited Kellett har gained an advantage in smaller total span of its two rotors by setting its rotor heads close atop the fuselage so that the two rotor diameters largely overlap Engines are placed outside and do not occupy valuable cabin space yet they are faired against the fuselage sides so there is no need for extra structure.

McDonnell mounted rotors on pylons extending from the fuselage in a configuration similar to the American Platt LePage and German Focke helicopters Engines also were contained in nacelles halfway out on the pylons Originally the McDonnell design had total rotor span of 81 ft Recently the first 40 ft rotors were replaced with 46 ft rotors which overlap slightly The span is now 87 ft McDonnell's helicopter design gross weight was approximately the same as for the XR 10, but recently with the larger rotors the XHJD-1 lifted 12,600 lbs total, or nearly a ton more than its design gross weight probably setting an unofficial international record

The Piasecki design mounts its twin rotors in tandem, at nose and tail of the fuselage, with the powerplant buried in the center of the fuselage This design eliminated the drag resulting from exterior pylons and nacelles, but requires cabin space for power plant and fuel installation A larger twin engine Piasecki design, using the same fore-and-aft configuration with engines mounted at both ends, is reported under development The XHRP 1 now flying can carry more than a ton of useful load and accelerate to speeds of more than 100 mph It provides more than 400 cu ft of useful space at its center of gravity

When Kellett was exhibiting its mockups to potential air transport customers last summer the company estimated the commercial version could be built at a price comparable to that for all metal fixed wing twin engine transports with similar interior fittings Presumably a complete re-evaluation of costr would be necessary as a result of changes in many cost factors since Original Kellett army contract called for only two XR 10s However it ir possible that this order may be increased, if not already, in view of the craft s showing in its first trials

FIRST FLIGHTS OF XR 10—Pleased with results shown in first flights of the Army's new Kellett XR-10 twin-engine helicopter, which carries 10 persons besides a crew of two, are Kellett and military officials who conducted the flight tests at North Wales, Pa Left to right J D Drakill, Kellett pilot, Col A T Culbertson, A W Bayer, co pilot, L L Douglas, chief engineer, Maj W C Dodds, P R Skilling, tructee for the Kellett Aviation Corp, and L C Peskin, helicopter division manager (AAF photo)

First Stratocruiser

First Boeing Stratocruiser was to make its initial flight last week and will be joined next month by the second ship off the line in a test program of 50 000 miles flying that, it is hoped, will bring CAA certification in the Fall Number two airplane will be the first of 20 ordered by Pan American Airways While the first two planes are being put through the test paces Boeing will be outfitting the other PAA Stratocruisers

Boeing's orders for the Stratocruiser total 55, plus one AAF version, YC-97B Cost of the basic airplane is $1,250,000 for the 80 passenger version, with a labor escalation clause, and plus modification costs None of the six airlines buying the plane—PAA, Scandinavian Airlines, United, Northwest, American Overseas, British Overseas—is getting the 80-passenger plane

Matson Stops Service

Matson Navigation Co has discontinued its nonscheduled DC 4 service between the Pacific Northwest and Honolulu but will continue to press its application for a CAB certificate authorizing scheduled operations over the route

Second XB-35 at Muroc

Second of the Northrop XB 35 flying wing bombers has been delivered to Muroc Army Air Base for test fiving The ferrying flight was unexpected since high speed taxi runs were planned Fred Bretcher, who served as copilot on initial flights of the first XB 35, had Max Stanley as copilot and O H Douglar, flight engineer Stanley was pilot on the maiden flight of the first XB 35

Morris Leaves Bendix

C L (Les) Morris, assistant to the president of Bendix Helicopter, Inc, resigned late last week Though he has not announced future plans it is understood Morris will probably stay in some phase of aviation

Morris was Commissioner of Aeronautics for Connecticut ten years before joining Sikorsky Div of United Aircraft Corp as its first helicopter test pilot He organized and headed the division before being made assistant to the president

AAF Generals Hail B-50 As New Standard Superbomber

First flight tests at Seattle successful; 425 mph top speed, better than 300 mph cruise and external bomb load add striking power.

Top AAF generals view the new Boeing B 50 as a competitor of the Convair B 36 on the basis of strategic striking power after successful completion of early B-50 test flights at Seattle Lt Gen N F Twining, Air Materiel Command Chief, regards the B 50 as "the Air Forces new standard long range bomber" and Strategic Air Command generals look on acceptance of the B 50 into service as a healthy increase in AAF hitting power.

Although available data indicate a disparity in range and bombload between the B 50 and the B 36 the 425 mph top speed and better than 300 mph cruising speed of the former renders it a potent factor in offensive power Over its range of 5 000 miles the B 50 can carry reven tons of bombs to the target in four hours less time than the B 36 carrying the same load This enables the B-50 to complete five missions while the B 36 is completing four, although delivering only one third the bomb load at reduced range. This speed indicates a potential usefulness for the B 50 as a fast strike strategic bomber as compared to the heavier hut slow strike capabilities of the B 36

► **High Altitude "Specs"**—High altitude specifications of the B 50 have been reduced on the basis of wartime B-29 experience which proved the cost of 30-40 000 ft operation excessive in engine life and airplane performance The B 50's Pratt & Whitney Wasp Majors carry only one General Electric CH 7A turbo supercharger each, compared to two on the B 29, to provide rated altitude output at the 12-15,000 ft level Ceiling of the B 50 is better than 35,000 ft, however due to the 59 percent increase in power over the B 29

Special attention har been devoted to reducing landing speed in the B 50 due to the 15 000 lb. increase in normal gross weight, most of which goes into increased fuel capacity demanded by the larger engines The outboard nacelle afterbodies have been enlarged matching the inboard design, thereby providing increased flap area and reducing the final approach speed Curtiss Electric reversible pitch propellers cut the landing run to about one third

► **Rudder Boost**—A major innovation in the B 50 is power boosted rudder control system Considerable design effort was expended on the B 29 to produce an aerodynamically balanced rudder requiring no boost This rudder proved to be near the maximum size permissible for no boost operation Increased rudder size of the B 50 has necessitated power boost, although efforts are continuing to eliminate this feature through proper design of the rudder leading edge porrible by the use of a sealed gap arrangement

Thermal deicing control is used throughout the B 50 to enhance its all weather characteristics The "hot wing" deicing system is operated by three Stewart Warner combustion heaters located in each outboard nacelle instead of utilizing engine exhaust gas as in conventional installations

Two heaters are located in the dorsal fin to provide deicing for the fin, stabilizers and the rudder This is the first control surface to be equipped with thermal deicing Two other heaters are used to provide hot air for the pilots windshields, the three sighting blisters in the aft fuselage and the tail gunner's window Propellers are equipped with electrical deicing equipment

► **Bomb Load Varies**—Bomb load of the B 50 remains substantially the same internally as the B 29—20 000 lbs maximum—because this limit is set by space rather than disposable load requirements. Increased fuel capacity possibly as high as 10 000 gals max, is indicative of the increased load carrying ability of the B-50 This has raised wing loading from 68 5 to more than 77 lbs /sq ft, with consequent adverse effects on landing speed rate-of-climb and ceiling

Increased engine power and wing structural strength enables the B 50 to carry an increased external bomb load at reduced range Although the B 29 carried no external bomb provisions the additional power of the B 50 would permit an additional 20, 000 lbs to be carried externally, thereby doubling the bomb load over short range

Although present plans are to install 50 cal machine guns in the B 50's four remote-control turrets (four 50's in the front upper turret), studies have been completed on the adaptation of the mounts for twin 20 mm cannon installation of which will depend on the outcome of Wright Field armament tests B 50 tail turret retains the 20 mm cannon of the B 29

► **Photo Version**—As a photo-reconnaissance plane the B 50 can be modified to a 10 000 mile range with an endurance of 35 hours Normal maximum range is slightly more than 7 000 miles without bombs Top speed at light weight and altitude is near the 450 mph mark with normal maximum at combat gross weight of better than 400 mph

Outboard wing panels and tail assemblies are being manufactured at the Boeing Wichita (Kansas) division with fabrication of other assemblies and final assembly and flight test taking place in Seattle A total of 133 is on order with production expected to reach three per week this fall

The B-50 on Takeoff

New Air Force Facilities Sought

Legislation to authorize a major War Department public works program, estimated at $225,000,000 for the 1948 fiscal year, has been introduced by Chairman Chan Gurney (R, S D) of the Senate Armed Services Committee.

The measure would permit completion of a supersonic wind tunnel at the California Institute of Technology establishment of rocket static test facilities and all altitude speed course at Muroc Army Airfield, construction of rotor wing testing facilities and testing laboratory, central heating plant and reavenging building for a wind tunnel at Wright Field

The measure providing housing facilities for most army installations, both Continental and Overseas, also would authorize these aviation projects:

- Alamogordo, N M, Airfield—Rocket firing facilities,
- Kelly Field, Tex.—Helicopter engine testing facilities,
- Marietta, Ga, Airfield—Control tower
- Rapid City S D, Airfield—Development of facilities for VVIIB
- Roswell, N M—Training facilities

Air Safety Board Studies Plane Fires

Step follows recommendations for terrain clearance indicators and new altitude minimums

By ROBERT HOTZ

Aircraft fires and low flying were under scrutiny last week by the president's special air safety inquiry board after a new series of recommendations urged that all transport aircraft be required to carry electronic terrain clearance indicators as soon as possible. A compliance date of next January was originally suggested for this requirement but the board refrained from setting a specific deadline.

Basing its latest recommendations on a study of the Capital Airlines (PCA) accident near Leesburg, Va., when a DC-4 struck 150 feet below the crest of a mountain ridge the board also asked that flight rules be revised to increase minimum altitudes to be flown over rough terrain

► **Several Devices**—Electronic terrain clearance indicators were recommended after the board flew in a TWA Constellation equipped with the radar device for terrain clearance warning now being manufactured by Hughes Aircraft Co. of Culver City, Cal. The $135, 16 lb device is being installed in the TWA fleet and some planes of Continental Air Lines. Other devices that would meet Board requirements are a new 150 lb. airborne scope radar set developed by the Navy and American Airlines-the Allison 65 lb. scope radar and wartime radio altimeters that are now selling as surplus for as low as $75.

An increase in altitude now required for terrain clearance under instrument conditions west of 104th meridian and over the Appalachians to 2,000 ft. was advocated, with the 1,000 ft. clearance remaining for daylight contact flight and over characteristically level country.

► **NACA Role**—The National Advisory Committee for Aeronautics was asked to monitor studies of mountain terrain effects on aneroid altimeters now under way by University of California and AAF in California. NACA is to evaluate results of these studies and submit recommendations on accuracy of aneroid altimeters.

The board took time out from its executive sessions to blast congressional slashes in air safety funds and to hold an open hearing on proposed permanent revisions in maximum take-off weight calculations for the DC-4 (AVIATION WEEK July 7).

► **Services Agree**—Both AAF and Navy agreed with the proposed CAA program for 68 units of high intensity approach lights, 23 units of GCA, 25 surveillance radar sets. Navy indicated no interest in ILS and AAF said it would use ILS only as a secondary aid in automatic landing of heavy transports and bombers. Recommendations to the board by the Air Line Pilots Association indicated the pilots were disturbed by location of some ILS installations on the "wrong" runways and lack of ADF compass locator stations at the inner and outer markers of the system.

► **Revise CAR**—In addition to the temporary revisions in gross weight take-off calculations for the DC-4 the board indicated it was considering ultimate revision of CAR 61.7122 and proposal of more interim recommendations as soon as conclusions could be reached. One of the big points at issue on the take-off weight formula computation is the slide-rule engineering calculations now in effect and backed by the airlines. Airplane pilots demand that actual flight tests be made with maximum loads in DC-4s to determine whether calculations are correct. Flight tests in Tucson, Miami and Mexico City have been proposed under high temperature factors at altitudes and in dry and humid climates. Lighted wind socks at both ends of all runways on all commercial airports have also been recommended by the board.

The board is also making an exhaustive investigation of design, manufacture, conversion and maintenance procedures on the DC-4 in connection with the Eastern Air Lines accident at Port Deposit, Md. Preliminary CAB report issued last week stated that examination of the wreckage revealed that "some unit or assembly of the empennage failed in flight." A second series of hearings on that accident opened last week.

CAA NON SCHEDULED FLYING ADVISORY COMMITTEE

Newly reorganized CAA Non scheduled Flying Advisory committee, photographed at meeting with CAA officials in Washington, includes from left: George Haddaway, publisher, Southern Flight, Dallas, B. Allison Gillies, aviation consultant, San Diego, Joseph T. Geuting, Jr. manager, Personal Aircraft Council, substituting for John Friedlander, president, Aeronca Aircraft Corp.; Don Flower, sales manager, Cessna Aircraft Co., Wichita, Dick Depew, Ludington-Griswold Co., Sayhrook, Conn.; William L. Anderson, Pennsylvania aeronautics director, Lloyd Child, executive secretary of committee; T. P. Wright, Civil Aeronautics Administrator, William A. Mara committee chairman, advertising and publicity director, Bendix Aviation Corp., Detroit, Fred E. Weick, vice-president, engineering, Engineering & Research Corp., Riverdale, Md., Ed Williamson, president, Bearings Service Co., Seattle; Harry W. Playford, president, U. S. Airlines, Inc.; St. Petersburg, Fla., Oliver L. Parks, president, Parks Aircraft Sales & Service, East St. Louis, Ill., and Leslie Marsden, president, Buffalo (N.Y.) Aeronautical Corp.

CAA Budget Cut $5,613,306 For 1948

Congressional action was completed last week on a 1948 fiscal year Commerce Department supply bill setting a $119,234,814 budget for the CAA and a $3,000,000 budget for the CAB.

CAA's allocation was the low figure proposed by the Senate. $5,613,306 below CAA's 1947 fiscal year appropriation of $124,848,120, $70,759,186 below the President's request for a $189,994,000 budget; and $5,220,670 below the House approved $124,455,484. House conferees on the Commerce appropriation, headed by Rep. Karl Stefan (R., Neb.) made no attempt to strike a compromise on the House-approved and Senate-approved CAA allocations, but eagerly embraced the low Senate figure to economize.

► **CAB Compromise**—CAB's $3,000,000 coming year allocation is a compromise between the $2,500,000 proposed by the House and the $3,100,000 proposed by the Senate. The Board's budget, while $509,400 above its 1947 fiscal year allocation of $2,490,600, is $380,000 short of the amount asked by the President.

Despite its clamorings since the start of the year for improved air safety facilities, Congress made a $25,198,934 slash in the President's request for a $36,308,000 appropriation for CAA for establishment of new air navigation facilities. The cut means that plans for installation of 68 additional ILS sets, 23 GCA units and 25 surveillance radar sets, and other air safety installations, will have to be cancelled. The $11,109,066 allowed by Congress for new navigation facilities will preclude any additional ILS installations and will permit installation of only two additional CCA, four surveillance radar sets and two high intensity light systems. CAA's 1947 fiscal year budget for new navigation facilities—$19,622,200—was almost double the amount authorized by Congress for the coming year.

Following is a summary of other items in CAA's $119 million 1948 fiscal year appropriation:

● **Airport development**, $32,500,000. This is half the $65,000,000 requested by the President and $22,500,000 below the $45,000,000 appropriated for fiscal 1947.

● **Salaries and expenses**, $72,923,248. This allocation, $1,841,764 above the amount approved by the House, carries with it a stipulation for a cutback in CAA administrative and supervisory personnel and an increase in operating employes. It is $11,187,752 below the President's requested appropriation. A compromise figure of $1,600,000 for CAA operation and maintenance of aircraft, a program which fixed-base operators have skeptically viewed as an encroachment on the private maintenance industry, is provided. The President requested a $2,050,000 appropriation, the House approved $2,000,000, and the Senate, only $1,500,000.

Boost Plane Funds

Senate Appropriations Committee last week added $203,490,000 in contract authorizations for purchase of new aircraft to the 1948 fiscal year War Department appropriation bill, over and above the $280,000,000 proposed by the Budget Bureau and approved by the House. Thus, an unprecedented in the economy minded Congress, would permit purchase of 1,100 new planes.

The group spurred by Chairman Chan Gurney (R., S. D.) of the Armed Services Committee, also added $34,000,000 for aviation gasoline purchases to increase the AAF's flying hours by 4,000,000, and provided for an AAF strength of 55 air groups in ready status. Funds previously approved by the House would have allowed only 38 groups and 15 skeletonized groups.

In addition to the hoost in contract authorizations for planes, the Senate committee added contract authorizations of $7,000,000 for radar and a like amount for guided missiles. This gives AAF total contract authorizations of $497,490,000, and a total budget of $1,355,933,591, as against a fiscal year 1947 appropriation of $1,064,500,000.

● **Technical development**, $1,600,000. This is an increase over CAA's 1947 allocation of $923,000, but less than half of the $3,500,000 budget requested by the President.

● **Washington National Airport**, $1,102,500. This is $233,000 above the airport's 1947 fiscal year budget of $869,500, and $27,500 above the President's request for $1,075,000.

Air Group Studies New Defense Plan

A new appraisal of national defense policies on aircraft production is being prepared by the Air Coordinating Committee, following release of its first report on the subject nearly two years ago. The new study for completion early next year.

Whereas the earlier report was prepared against a background of reconversion, the new report will consider the problem of expansability of the industry in a national emergency in light of the present low level of military procurement.

► **Stanford Study**—The new study will be prepared by Stanford University Research Institute on the basis of field studies by staff personnel, many of whom participated in the previous report prepared by Harvard Business School. The Stanford report will be integrated with simultaneous studies by the AAF Air Materiel Command and the Navy Bureau of Aeronautics to produce the formal ACC recommendations to the President. The AMC and Bu.Aer researches will be confined to the probable requirements of the services and related defense aspects of the problem.

The need for a new report has been created by changed strategic plans, failure of military procurement to reach minima used as the basis for the earlier recommendations, and greatly curtailed production of civil types, according to Garrison Norton, Assistant Secretary of State and ACC chairman. The new report is expected to reveal the Nation's vulnerable strategic position, the degree to which the industry must expand almost overnight in the event of attack, the types of advanced industrial preparedness measures needed and the volume of peacetime procurement necessary to maintain the necessary degree of expansability.

LIGHTPLANE RACE ENTRY

Built by group of Lockheed engineer pilots, Cosmic Wind is slated for lightplane events at coming National Air Races. Cross weight is listed at 800 lb., and high speed is estimated at approximately 200 mph. Glen Fulkerson, one of Lockheed group which built plane, is in cockpit. (Press Ass'n photo)

AVIATION WORLD NEWS

South Americans Bid For Local Markets

Designers in several South American Countries have produced plans and prototypes for local markets

A four place monoplane designed by Pablo Banaudegui, Pando, Uruguay, bears a striking resemblance to the Stinson Voyager is powered by a 125-hp Lycoming and features a wire braced steel tube fuselage, sprang loaded flaps, and wing slots The landing gear is retractable.

A tandem trainer, admittedly a copy of the Piper Cub, is being produced by the Companhia Aeronautica Paulista, Sao Paula, Brazil It is powered by a Lycoming 65 hp engine Over 400 of these have been produced to date with current schedules calling for 50 units per mo

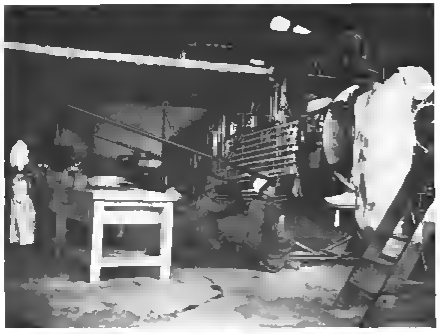
▶ **Transports and Fighters**—A single engine transport similar to the old Stinson Reliant is being manufactured by the Peruvian airline Compania de Aviacion Faucett, S A Designed primarily for feeder and short haul freight work these planes are reported to be more versatile than models currently manufactured in the United States.

The Argentina national aircraft factory at Cordoba is at present producing a fast medium bomber akin to the British Mosquito but modified to operate with twin Pratt & Whitney engines in place of the usual liquid cooled Rolls-Royce engines The overall dimensions are those of the British fighter bomber

Characteristics reportedly remain about the same

Argentine Version of the Mosquito

Uruguayan 4-Place Cruiser



Faucett's Peruvian Transport

Brazilian Copy of Piper Cub

Automatic Instrument landing system **now available** for use with Navigational Trainers

The Curtiss-Wright Dehmel Automatic Radio Aids Unit facilitates pilot training by its realistic simulation of various radio aids. This unit can be used with all types of navigational trainers.

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Further Airline Losses Seen As Summer Earnings Disappoint

Few carriers likely to have cushion against coming winter after first-of-year deficits; seasonal traffic slow in upturn.

The domestic airlines must generate substantial earnings during the current summer months if deficit operations for the year are to be avoided. For most carriers this promises to be a difficult task and most likely will result in the industry as a whole completing a second consecutive year of heavy losses.

For calendar 1946, the 15 domestic lines lost an aggregate of about $15.5 million. For the first quarter of this year, these same carriers are estimated to have had a net operating loss of more than $20 million. Eastern's net income of $3,504,643 in 1946 and $564,695 during the 1947 first quarter reduced the industry's losses to the amounts indicated.

▶ **Traffic to Vary**—Seasonal traffic fluctuations, smoothed out by war-inspired operating conditions once again will become more pronounced. Traditionally, the summer months, have always been the most profitable for the majority of the carriers (Eastern and National, with their peaks during the winter months, are exceptions). More favorable flying weather and increased vacation travel are the primary stimulants to the highly profitable operations generally recorded during summer months.

This year, seasonal profits got off to a late start. The normal traffic upturn was very hesitant in exerting itself, as a direct result of the recent series of fatal crashes. Load factors, while not declining, failed to rise to any appreciable extent as was first anticipated. A mitigating circumstance is also found in the increased availability of augmented aircraft fleets. Most of the carriers did not experience their first profitable month this year until June, and then were estimated to have been in the black by only nominal amounts.

▶ **Summer Earnings Needed**—Accordingly the industry must run up adequate earnings during the months of July, August, September and, if weather permits, October, to offset heavy deficits of the first four or five months of this year and leave a balance to ride through the winter months of 1947.

Very few airlines will be able to perform this feat this year. The reasons are not hard to find. As previously noted, the anticipated traffic upturn has fallen short of expectations, reflecting the aftermath of the recent accidents. However, as increased safety measures are implemented and confidence restored, airline traffic may again be expected to show a vigorous growth.

With a few notable exceptions, proper managerial control over operating expenses is not being realized and tends to reduce profit margins. It is possible that to a certain degree this condition is due to non recurring circumstances. For example the integration of new equipment into company fleets is an expensive process. By the same token, the failure of additional new type equipment to be delivered has proven very burdensome to the industry as it has been forced to operate with a very high percentage of high cost and relatively outmoded equipment. However, a dynamic favorable factor is present in the 10 percent increase in the basic passenger fare structure and the extra fares prevailing for the Constellation and DC-6 type equipment.

▶ **Safety Rule Influence**—Retarding the development of current earnings will also be increased expenditures and restrictive pay loads as a direct outgrowth of augmented safety regulations. Certain of these measures have been in the CAB procedural mill and others will stem from the President's Special Board of Inquiry On Air Safety. One such regulation is now in the process of being imposed. Weight limitations, resulting from the recommendation for the revision of the "wind factor" formula used by the carriers in determining their take-off loads, may reduce payloads from 3,000 to 4,000 pounds.

Additional recommendations of a similar nature may be expected. They may be implemented into further regulation revisions calling for more frequent overhaul and check periods of engines and aircraft. Increased maintenance procedures may also be inaugurated. The installation of added radio and allied devices designed for increased safety may also be ordered. In the realm of possibility is the addition of a flight engineer or third officer on all four-motored equipment. In fact, this measure is being strongly urged by the Air Line Pilots Association. All this and even additional measures of a similar nature will serve to increase airline operating expenditures and drain current earnings. However, anything increasing the safety of air transportation will redound, in the final analysis, to the industry's long range benefit.

▶ **May Tighten 04**—It is highly probable that Part 04 of the Civil Air Regulations which deals with the certification of new planes for commercial service may be tightened. This may entail further delay and higher initial costs for the new type equipment not yet approved. This includes the Convair 240, Boeing Stratocruiser and Martin 202 and 303.

As final profits for 1947 become more remote, considerable revision of this year's first quarter reports will be in order. A number of the major carriers have tended to reduce or minimize first quarter losses by arbitrary tax "credits". This was done on the assumption that profitable results for the final year would ensue and it would be fair to equalize the tax burden over the entire year. However, in the failure of earnings to develop to the extent sufficient to offset previous tax "credits", it is obvious that first quarter deficits will be adjusted to even larger amounts.

▶ **Expired carry back**—These tax "credits" must be distinguished from the "carry back tax credits" which were operative last year and which expired for all companies having their calendar year ending Dec. 31, 1946. Only those companies whose fiscal years end at periods other than the calendar year are in a position to avail themselves of the "carry back tax credit". One such company is Northwest Airlines, which had its previous fiscal year end at June 30. As of March 31, 1947, this carrier showed a tax carry back credit of $673,890. The company recently changed its fiscal period to coincide with the calendar year but is expected to retain the tax credits.

United Air Lines for example, reported a net loss of $3,450,671 for the first quarter of 1947 after a tax credit of $1,921,000. Unless sufficient earnings develop to utilize this credit, the first quarter figures may have to be adjusted to a net loss of $5,371,671. American has also taken a tax "credit" of $2,220,000 to reduce its first quarter loss to $3,073,636. Braniff, for the same period, has made an accounting tax "credit" of $72,000, bringing its loss to $510,364. PCA and TWA evidently conceded their dismal profit outlook by not establishing any tax "credits", reporting net losses of $2,309,705 and $5,723,523, respectively.—Seth Altschul

Minneapolis-Honeywell Grants Pay Raise

A 20 cent per hour wage increase for factory employees and extension of the present labor contract to Feb. 1, 1949, has gone into effect at Minneapolis-Honeywell Regulator Corp. in Minneapolis.

A joint statement by S. M. Sitz, industrial relations manager, and R. J. Wishart, union leader, said: "This increase follows an increase of 10 cents an hour, provisions for paid holidays, three week vacations for ten year service, and other benefits agreed upon in March."

Since early spring the company has laid off about 1,300 employees because of slowdowns in the heating and construction industries, bringing current employment to about 4,200 workers.

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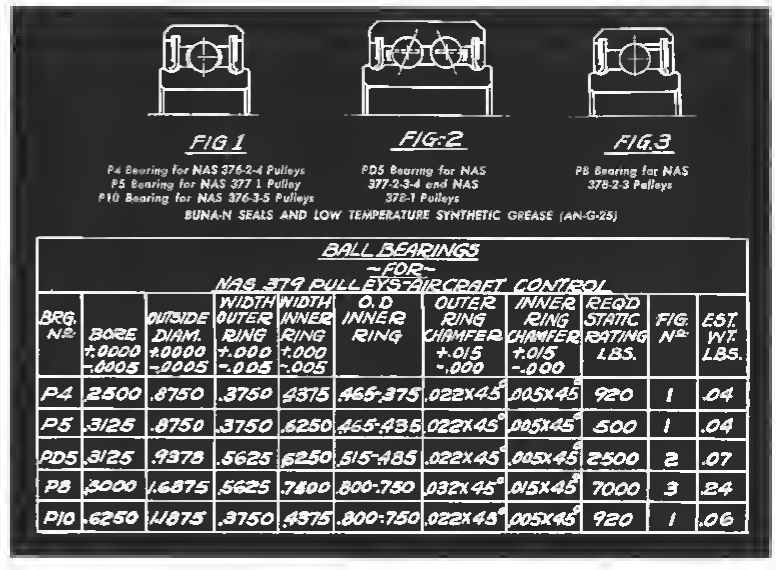

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BRG. NO.	BORE +.0000 -.0005	OUTSIDE DIAM. +.0000 -.0005	WIDTH OUTER RING +.000 -.005	WIDTH INNER RING +.000 -.005	O.D. INNER RING	OUTER RING CHAMFER +.015 -.000	INNER RING CHAMFER +.015 -.000	REQD STATIC RATING LBS.	FIG. NO.	EST. WT. LBS.
P4	.2500	.8750	.3750	.3375	.465-.375	.022X45°	.005X45°	920	1	.04
P5	.3125	.8750	.3750	.6250	.465-.435	.022X45°	.005X45°	500	1	.04
PD5	.3125	.9378	.5625	.6250	.515-.485	.022X45°	.005X45°	2500	2	.07
PB	.3000	1.6875	.5625	.7400	.800-.750	.032X45°	.015X45°	7000	3	.24
P10	.6250	1.1875	.3750	.4375	.800-.750	.022X45°	.005X45°	920	1	.06

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Freak "Supersonic Sickness" Threatens Jet Engine Testers

Newly discovered malady attacks only those working near engine tailpipe; pilots not affected. Caused by impact of ultra-high sound waves.

By WILLIAM KROGER

Army, Navy and some manufacturers cautiously are preparing reports on ultra high frequency sound waves that affect humans—a freak by-product of the testing and operations of jet engines that, while apparently not dangerous, is new enough to be studied with the utmost care and a great degree of secrecy.

Commonly known as "supersonic sickness," the malady takes the form of general lassitude, unsteadiness in walking and, sometimes nausea. It apparently has no lasting effects and attacks only those working within a rather narrow cone around the tailpipe of a jet engine. AAF and the Navy admit some of their engineers have been stricken, engine manufacturers report no cases, but at least one airframe manufacturer has had experience with the phenomenon.

▶ **Jet Pilots Safe**—There is no anticipation that the sickness will hit pilots of jet planes, both because they can be shielded and because they are out of the cone. Jet engine manufacturers seem so far to have had no trouble with it because they do their testing in enclosed cells. One, however, has reported that a glass window in a test cell was cracked by the ultra high sound waves.

Airframe manufacturers engaged in construction of jet planes seem to be the most interested parties. At least one, who tests jet engines out of doors, had an engineer who became sick after he had been working close to the tailpipe for some time. Because of personnel problems relating to potential personal injury claims, airframe manufacturers are maintaining an understandable silence, although there is a possibility that supersonic sickness may be discussed at a meeting to be held shortly.

▶ **Vibration is Cause**—The cause of the sickness is the high-pitched vibration emitted by the escape of gases from the tailpipe of a jet engine. These are far above the range of human hearing—like the trick dog whistle that a dog can hear but a man cannot.

The effects of high frequency noise has been the subject of extensive study throughout the war by both AAF and the Navy's Bureau of Aeronautics. These studies indicate that the auditory mechanism can literally be torn apart by steep front pressure waves such as the supersonic shock waves emanating from a jet engine.

The high frequency sound waves potentially are capable of doing two-fold damage. The hearing can be impaired by the shock's blasting the ear drums, or the vibrations can affect the nervous system. In the few cases so far reported, damage to the hearing was only temporary.

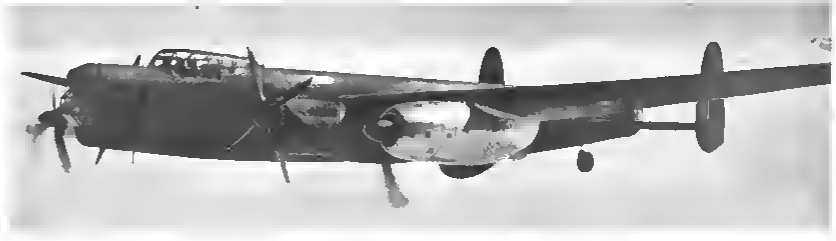
▶ **Impaired Hearing Reported**—Dr. Paul O. Greeley, head of the Aero Medical Laboratory of the University of Southern California, says that to his knowledge only cases of impaired hearing have been claimed. He also states that "not enough is known of the behavior of ultrasonic waves for us to be positive that they are damaging."

That same cautious approach is manifested among Army, Navy, and manufacturing personnel queried by AVIATION WEEK.

While not confirming that the supersonic sickness is a problem, all parties are examining it, and possible counter-action, closely. One proposed solution is an ear plug designed to attenuate the high pressures, thereby relieving the auditory nerves of the shock. But this solution also contains a problem. The plugs must be made of high density material, but the material itself has to be one that will not vibrate in harmony with the noise waves. If it did, it would only aggravate the harmful effect of the noise.

▶ **Far-reaching Study**—An indication that the study of supersonic sickness is far-ranging was a speech by Gen. George Kenney in Boston recently. He posed the question "What about the use of sound as a weapon?", then stated, "An airplane equipped with a sort of super dog whistle conceivably could fly around a city for a while and upset the nervous systems of the whole population."

The strange effects of jet engine noise



BRITISH GROOM TURBOPROPS FOR FUTURE COMMERCIAL USE

Tests of Bristol Theseus turboprops on this Avro Lincoln bomber is in keeping with British move to develop turbine-propeller power plants for use on medium speed commercial transports. Reciprocating type inboard engines have been cut and props feathered while outboard turboprops are put through their test paces.

have been manifested also in England where a worker in the engine plant of De Havilland reportedly was taken sick Concurrent with this was a claim by British scientists that they could kill a rabbit at 100 yards with a "sound gun"

The various studies of the effects of the high frequency vibrations from jet engines have been intensified only recently in the U S However, the Germans ran into these effects early in their jet engine program during the war and conducted extensive tests with concentration camp inmates to try to determine all possible results on humans of these vibrations

New Research Project To Probe Propellers

Research toward development of propellers that will operate continuously at supersonic speeds regardless of the forward speed of the airplane on which they fly, will be undertaken by the University of Illinois Aeronautical Engineering Department under a contract with Aeroproducts Division, General Motors Corp, Dayton Ohio

The new research problem, if successfully solved, would eliminate the main limiting factor of propeller usefulness the compressability problem at high tip speeds and would put the propeller back in the running for use in high speed aircraft well beyond the speed ranges for which it presently is considered useful

Construction is now under way at the University of Illinois Airport, Champaign Ill, on a flow laboratory for instruction and research, which will include a supersonic wind tunnel which may operate at a maximum of mach 3 or three times the speed of sound Compressors adapted from Army surplus aircraft engines are designed to develop a total of 28 lbs of air per second at a pressure of 140 lbs per square inch, for the tunnel

Goodyear Canning Contract

Allotting 150,000 sq ft of space in its Akron Airport plant for participation in the Navy's new 'canning' program Goodyear Aircraft Corp will begin to assemble 28 ton corrugated steel containers for preserving over 2,000 surplus planes in fly away condition for periods up to five years Fabrication of the container 10 ft panel components is being done by the Youngstown Steel Door Co

Craft valued at $150,000,000 will be housed, wings folded, in the sealed units linked in groups of four to six equipped with de-humidifying apparatus, at six Naval air bases It is estimated that 444 cans will accommodate 800 fighters, 450 attack planes and 750 trainer and utility craft including some twin-engine ships

Navy considers the canning process superior to sprayed plastic "cocooning," it is reported

Industry Observer

► **Look for the world speed record holding Lockheed P-80-R to make an early attempt to better its 623 8 mph mark. Experts believe it can push the record past the 630 mph mark with relative ease under favorable conditions but the next five mile jump required for a record will prove a tremendously difficult hurdle for some time to come Meanwhile Republic is grooming a P-84 for another record attempt this summer at Muroc before the P-80-R boosts its mark.**

► AAF top brass are plenty worried over what the Russians are doing to the ME 262 German twin jet fighter Intelligence reports indicate the Russians are making them faster than German wartime production and Wright Field tests indicated even the older 262 model in AAF hands could outperform the P-80 As a result Hughes Aircraft Co now has contract for exhaustive engineering and flight tests on a captured 262 and C C Moselev's Cal Aero Technical Institute is running tests for AAF on the Jumo 004 engine that powers the ME 262

► **Douglas is about to build a new twin jet fighter for the Navy Project is waiting on final contract negotiations It will be the first Douglas fighter since the XFD-1 biplane of 1933.**

► Eight remote control turrets on the Convair B 36 will house two rapid fire 20mm cannon to be installed at Wright Field This is first U S movable 20mm aircraft mount although Russians used them on their four engined TB 7 bomber and the British has 20mm turrets on the Avro Lincoln

► **NACA will flight test some new and interesting light planes in the fall if preliminary research indicates possibilities of fundamental improvements particularly on two-control and twin boom pusher types.**

► Grumman has completed design studies of a 25 ton, twin-engine amphibian aimed at Navy cargo or 32 passenger civilian use

► **Los Angeles Airways Inc recently awarded CAB's first experimental helicopter mail certificate, saved $86,000 on purchase of its four Sikorsky helicopters by ordering them last fall when the price was $48,500 apiece. Today's pricetag on the S-51 is $70,000.**

► Look for the airlines to make extensive studies on the use of wartime radar fouling devices known as "window" for possible commercial application on radar airways Ejection of the tinfoil "window" cards may be used as a distress signal or for positive identification of lost aircraft since it shows up like a neon sign on radar scopes

► **Extra power developed by the Allison Model 400 (modified J-33-21) jet engine used in the P-80-R record run is causing some airframe manufacturers now designing planes around the axial flow TG-180 (J-35) to take another look at the rotary compressor turbojet Engineers believe that eventually the J-35 will be the better engine but currently the J-33-21 has more power and is considerably lighter, making it a better bet in the multi-jet bombers now heading for immediate production**

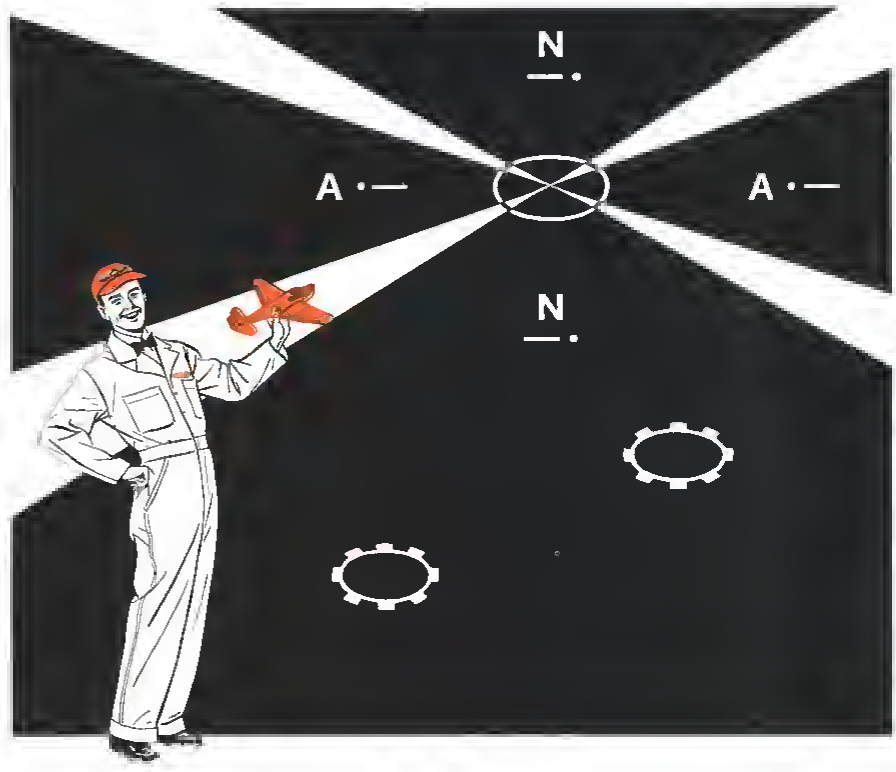
► Jack Northrop apparently is convinced that his flying wings are going to be part of the aircraft industry for some time to come After building 13 types of flying wings since 1929, he has adopted the term "flying wing" as trademark of his company, Northrop Aircraft Inc

► **Vickers' supermarine attacker has a top speed of 590 mph at sea level decreasing to 538 mph at 30,000 ft Normal cruising is 380 mph. Carrying 580 imperial gallons of gas, its range is 1,100 miles. Initial rate of climb is 6,600 ft. per minute with a service ceiling of 51,800 ft Armament consists of four 20mm cannon in the wings and a 2,000 lb. bombload or four 300 lb. rockets. It is powered by a single Nene I jet engine**

► Navy is experimenting with aluminum alloy armor which appears to be more effective and considerably lighter than conventional steel plate

► **Beech has two Model 34 feederliners in various stages of completion Second is undergoing static tests at present and the other is being readied for flight testing.**

► Wright Field experts expect to encounter compressibility problems in the new high speed bomber series—XB 45-48—as low as mach 7 because of induced high velocity air flow around engine nacelles, canopies, wing fairings and fillets They also feel that power plants available in the immediate future will not provide the combination of power and range required for supersonic bombers



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Internal Aerodynamics Opens New Speed Fields

Proper handling of supersonic airflows inside power plants held capable of reducing ramjet fuel consumption to reciprocating engine-levels.

Internal aerodynamics a new field of technical specialization, may offer the most immediately effective path for improvement of jet aircraft performance. Rapidly emerging importance of this new field is indicated by the recent formation of a special Subcommittee on Internal Flow by the National Advisory Committee for Aeronautics to recommend special research programs in the science of handling air inside the airplane.

Pointing up the increasing magnitude of the problem is the fact that a 10% increase in air handling efficiency in a standard turbojet engine could mean a 30% increase in thrust output or a reduction in fuel consumption saving as much as 525 gal. of fuel in a 4 hr. Lockheed P-80 flight.

Of tremendous future importance is handling of supersonic air flows research on which is still in the experimental stage. Success of the supersonic ramjet engine depends greatly on its achieving a compression ratio of 8 to 1 or more, merely by its passage through the air. This could mean a 300% gain in pressure ratio and a corresponding 100% reduction in fuel consumption over the subsonic jet engine to a figure as low as 0.5 lb. of fuel per lb. of engine thrust per hr., making the ramjet engine economically competitive with the conventional reciprocating engine.

Indicative of the potential gains in aircraft performance and economy that can result from increased internal aerodynamic efficiencies are these facts:

▶ Jet aircraft already must handle as high as 15 tons of air per min. internally with immediate prospects of this figure climbing to 30 tons per min.

▶ From 60 to 80% of the power of a turbojet engine is utilized for air handling alone.[1]

▶ From 30 to 70% of the sealevel power output of an aircraft power plant must be dissipated in the form of heat.[2]

Although it is a new field, fundamental research data are already available making possible the design of an internal airflow system with no increase in drag over the basic streamline form the airplane.[3] Wing inlets may now be designed which can actually improve the aerodynamic characteristics of the wing.[4]

Internal aerodynamics is sharply divided in two fields of specialization: first, subsonic air handling (for both reciprocating and turbojet engine systems) and second, supersonic air handling (for the various forms of jet engines). While the subsonic case is fairly well understood up to critical Mach numbers, extensive research is being pressed to develop basic theory and practical design data for supersonic internal aerodynamics.

The basic internal airflow system consists of an air intake (inlet, diffuser), an internal path (duct), a radiator (engine, turbine, oil cooler, etc.), and an outlet (tailpipe, nozzle). Each of these devices requires individual study with close attention to the relationship with the efficiency of the overall system.

▶ **Subsonic Internal Flow**—The turbojet engine sucks air at low speed (taxiing, takeoff and climb) but as forward velocity is increased to cruising speed, the airplane speed becomes approximately equal to the velocity of air entering the engine.[5] At higher flight speeds, ram pressure is developed and excess air is deflected around the airplane. The ratio of air inlet area to engine inlet area should provide a compromise which does not penalize either the takeoff or the high speed performance of the airplane.

WING AIR INLETS, as used on Lockheed P-80 leave nose of fuselage free for armament or photo equipment

New Committee

Recognizing the increasing importance of internal aerodynamics in aircraft design, the NACA has just formed a special subcommittee on internal flow, with Joseph H. Keenan, professor of mechanical engineering at Massachusetts Institute of Technology, as chairman.

Members are: Col. Paul H. Kemmer, chief of engineering plans, AAF; Lt. Comdr. William Schubert, head of ram and pulse jet section of the power plants division, Navy Bureau of Aeronautics; Dr. Kennedy F. Rubert, director of NACA's induction aerodynamics laboratory at Langley Field; Abe Silverstein, chief of NACA's wind tunnel flight division, Cleveland; Walter Vincenti, Ames Laboratory, NACA; Dr. William Bolay, consultant, North American Aviation, Inc.; Prof. Howard W. Emmons, Harvard University; L. J. Jerger, pilotless aircraft division, Fairchild Aircraft; Dr. Stewart Way, research laboratory, Philadelphia Division, Westinghouse.

Most important design criterion is the ratio of air inlet velocity to free stream velocity. If these two values are the same, the streamlines will be nearly straight and a sharp inlet leading edge can be used, resulting in low drag. If this ratio is low, which is often the case with high speed aircraft, the streamlines may turn sharply outward and through approximately 90 deg. to resume their original direction, resulting in large drag rise. The general efficiency of an internal system is a compromise between external drag and internal loss and designer's attempt to hold the sum of these losses to a minimum.

▶ **Design Data**—Present practice is to locate the entrance to air ducts at a leading edge (fuselage or wing) because a pressure stagnation point exists which brings the air to rest with a minimum loss of total pressure.[4,6,7] All air intakes, such as engine cooling air, oil coolers, intercoolers, superchargers, etc., are normally grouped at this point, even when it is necessary to increase the cowling area.[8] A typical example is the Boeing B-29 installation.

Recent research indicates that jet engine nacelles are best located with their centerline along the wing chord[4] and not projecting too far forward of the wing leading edge, due to adverse affects on the drag, span load distribution and longitudinal stability.[9] The North American XB-45, Convair XB-46 and Martin XB-48 deviated from these requirements because of structural limitations in current design practice.

The air inlet design with a nose shape of sufficient curvature to prevent breakaway of the flow over the duct lip over a range of flight attitudes has shown superior efficiency, as has an entrance large enough to insure small internal expansion losses.[10]

Wing air inlets offer convenient locations when the nose of the fuselage is used for armament, as in the McDonnell XFD-1 and

XF2D-1 or a reciprocating engine as in the Ryan FR-1. Proper design can avoid pressure peaks and maintain laminar flow resulting in preservation or actual improvement in critical compressibility speed, range of lift coefficients for low drag, maximum lift coefficient and the drag of trailing edge flaps.[4]

▶ **External Scoops**—When their use is mandatory, external airscoops can be designed with a drag as low as 1% of the total airplane drag[11] by following nose inlet design practice.[10] Afterbodies should be of sufficient length to avoid separation (4 to 11 times the scoop depth)[9] and best practice is to merge the scoop afterbody into the nacelle, as in the Martin XP4M-1, or fuselage, as in the North American P-51. Republic P-47, etc.

One of the most promising new forms of air inlet is the submerged type as used on the new Ryan XFR-1, a recent study of which revealed that by diverging the walls of the ramp as the submerged entrance was approached, appreciable recovery of pressure could be obtained.[8] The boundary layer flows around an "eyebrow" and a "lip" collects the air for the duct system.

Best duct design practice indicates a gradual expansion of high entrance velocity air to prevent excessive losses[9] and elimination of irregularities in the entrance region, which easily upset flow. The transition from laminar to turbulent flow occurs at a critical Reynolds number[12], which varies according to the value of the disturbance in the inlet.[13]

Transition of the boundary layer may be avoided by using low angles of divergence in the duct walls.[14] Round ducts, which avoid sharp elbows and accelerate the flow have shown the lowest losses. A duct inlet of uniform height, to prevent separation, and a vane located slightly aft of the inlet to drain off the boundary layer—as in the Lockheed P-80 air intakes—have proved efficient in tests.

▶ **Cutting Duct Losses**—Losses are frequently created by high velocities, abrupt changes of shape or cross-section,[7] butterfly valves or duct leakage, which may be avoided by a duct sealing band. Duct couplings should be designed to accommodate turbojet engine expansion.[6] Recent tests reveal that an air shutoff system should be provided multijet bombers because the windmilling drag of a "dead" engine can result in a drag of 15% of the maximum net thrust at 500 mph and 25% at 650 mph.[5] Screens have been recommended to prevent entrance of foreign matter and an internal inertia separator to avoid turbojet engine icing or power losses created by rain or snow.[15] Ducts may be constructed of plywood[16] or plastics[17] of sufficient strength with the size and shape constituting the major fabrication design problems.

The duct outlet velocity should approximate the free stream and care should be taken to avoid extended regions of high velocity near the outlet, according to recent research.[4] A series of tests points to the cusped tail outlet as used on the Republic P-47 as the most efficient, and care should be exercised in its location due to the effects of jet spreading and waving during maneuvers.[19]

NORTH AMERICAN XFJ-1 takes advantage of ram effect by having flow straight through from nose intake to exhaust beneath empennage

▶ **Supersonic Internal Flow**—In order to use supersonic air for combustion purposes it must first be slowed to subsonic speed, the process of which also provides compression on which the operation of the supersonic ramjet and turbojet engines depend. This process creates a shock wave, which may either be handled outside or inside the supersonic inlet.

The interior shock diffuser consists of a converging nose inlet, which slows the supersonic air to the speed of sound, and a diverging duct, which slows the air to subsonic speed.[20] Tests have indicated that this type with circular open nose shapes may have efficiencies comparable to good, low speed diffusers.[3] This type diffuser must attain a high Mach number before starting (as is the case with the Navy Bumblebee ramjet missile) but its compression efficiency is about 85% (comparable to an F-80 compressor) and its exterior drag is quite low.

The exterior shock diffuser employs a pointed conical central body and an annular intake and has produced efficiencies of more than 90% at Mach number 1.85.[3]

▶ **Future Progress**—Subsonic internal flow systems demand careful attention to detail design of component parts and future design will place greater emphasis on extensive wind tunnel tests and mathematical analysis prior to construction of experimental aircraft. Higher output turbojet engines (such as the Menasco) will demand greater quantities of air and greater heat dissipation than heretofore.

High speed subsonic aircraft design will require increasing attention to the location of air inlets in nose and wing to reduce external drag, particularly over a wider range of speeds and angles than accommodated heretofore. The demand for thinner fuselages and wings will bring internal airflow technology into sharper focus with increased efficiencies mandatory.

Compression to be obtained by supersonic air inlets renders the supersonic ramjet engine one of the most attractive single mechanical elements in the aviation field today. Its success, however, will depend proportionately on the extent and fruitfulness of present research efforts now gaining momentum.

A more rigorous theory is greatly needed, and this is being attacked by a handful of physicists uniquely qualified for the work. This can be followed by extensive practical experiment which may well produce supersonic jet aircraft and missiles comparable in efficiency and economy with the familiar reciprocating engine.

References

[1] Puffer, S. R., and Alford, J. S., The Gas Turbine in Aviation, *Mechanical Engineering*, Dec., 1945.

[2] Judd, F. V. H., A Systematic Approach to the Aerodynamic Design of Radial Engine Installations. Paper presented at SAE National Aeronautic Meeting, New York, April 3-5, 1945.

[3] Becker, J. V., and Baals, D. D., Wind Tunnel Tests of a Submerged Engine Fuselage Design. Wartime Report L-485, NACA.

[4] Van Doenhoff, A. E., and Horton, E. A., Preliminary Investigation of Low-Drag Airfoil Sections Suitable for Admitting Air at the Leading Edge. NACA, 1942.

[5] Benedict, M. C., Aviation Gas Turbine Installation Problems. *SAE Journal*, Feb., 1946.

[6] Naiman, I., and Hill, F. R., The Effect of External Shape upon the Drag of a Scoop. Wartime Report L-321, NACA.

[7] Rogallo, F. M., Internal Flow Systems for Aircraft. Report No. 715, NACA, 1941.

[8] Thirty-Second Annual Report of the NACA, 1946.

[9] Millhoop, H., Aerodynamics of the Fuselage. TM No. 1036, NACA, 1942.

[10] Theodersen, T., Brevoort, M. J., and Stickle, G. W., Full-Scale Tests of NACA Cowlings. Report No. 692, NACA, 1937.

[11] Nelson, W. J., and Czarnecki, K. R., Wind Tunnel Investigation of Carburetor-Air Inlets. Wartime Report L-166, NACA.

[12] Reynolds, Osborne, An Experimental Investigation of the Circumstances which Determine Whether the Motion of Water will be Direct or Sinuous and of the Law of Resistance in Parallel Channels. Phil. *Trans. Roy. Soc.*, London, 1883.

[13] Trandil, L., and Tietjens, O. G., Applied Hydro- and Aeromechanics, McGraw-Hill Book Co., 1934.

[14] Katsoff, S., The Design of Cooling Ducts with Special Reference to the Boundary Layer at the Inlet. Wartime Report L-321, NACA.

[15] Dellinsky, A., and Diedh, F. W., The Atmosphere and Its Predicted Effects on Turbine Type Aircraft Engines. Paper presented at SAE Annual Meeting, Jan. 7, 1947.

[16] Burke, H. E., Plastic Bonded Plywood Ducts. Test 155, Republic Aviation Corp.

[17] Report TED NAF 2572, Bureau of Aeronautics, Navy Department.

[18] Falk, H., The Influence of the Jet of a Propulsion Unit on Nearby Wings. TM No. 1104, NACA, 1944.

[19] Bailey, N. P., The Thermodynamics of Air at High Velocities. *Jour. Aero. Sc.*, July, 1944.

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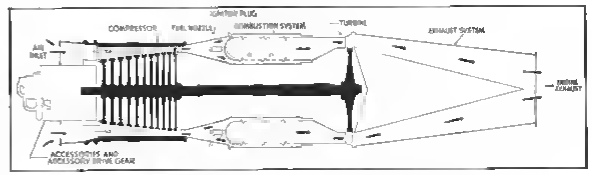
Design Analysis: General Electric TG-180 Turbojet

Here we investigate the vital installations which complement the major sections of this turbojet—accessories and drive; lubrication, fuel, ignition, and starter systems; engine mounting; and pilot's controls . . .Concluding this first engineering study.

By NEIL BURGESS

Aircraft Gas Turbine Engineering Div., General Electric Co.



Schematic Flow Diagram of GE TG-180 Turbojet

With the advance in turbojet engineering, much progress has been made in the refinement of accessories arrangement and exterior placement of piping and other component parts. This general design progress is notable in the TG-180, which constitutes a remarkably clean installation.

► **Accessories and Drive**—Accessory drive gear casing is mounted at the front of the unit and is bolted to the forward frame. Forward face of the gear casing has mounting pads and drives for engine and aircraft accessories, which are normally covered by a streamlined nose fairing. Piping, wiring, and the shaft for engine speed control are brought radially outward, through the fairing and airstream, within four streamlined "islands" having fittings for connections to be made by the aircraft manufacturer. The air inlet screen protects the compressor from pebbles or any objects which might accidentally be left in the inlet duct.

The non-rotating accessories, mounted in the accessory compartment or on the outside of unit, include: Flow divider, ignition transformers, air filters, drip valve, thermal units, and oil filters.

► **Lubrication System**—Lubrication system is a combination of solid oil jet lubrication for the engine forward end, including the accessory drive, and air-oil mist lubrication for the aft three bearings.

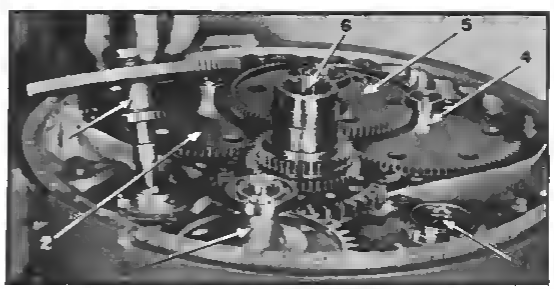
Oil is taken from the engine supply tank to the engine lubricator—a multi-plunger piston type pump, each piston having an oil displacement of approximately one quart per hour. Output of each piston supplies a separate jet, several of which are used to spray oil onto the front main bearing and accessory drive gears. Oil drained from the bearings and gears into the gear case is scavenged with a separate pump element and returned to the tank. One jet also supplies oil to each of the three main rear bearings in the aft frame between compressor and turbine. Air extracted through filters from the compressor fourth stage is also blown onto these three rear bearings for cooling and oil atomization. The air-oil mixture is drained overboard through a connection in the aft frame.

Oil is supplied to a separate pump element in the fuel pump, to supply lubrication for the latter, also hydraulic pressure for operation of the main fuel regulator. A small quantity of oil is lost through leakage in the fuel pump and the regulator, the remainder being returned to the tank.

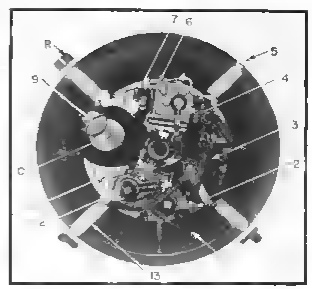
Total lubricating oil consumption, including the oil drained overboard, is approximately nine pounds per hour. No oil cooler is required, since the major part of heat rejected to the oil is carried overboard in the air-oil drain.

► **Fuel and Control System**—Reduced to bare fundamentals, control of a turbojet merely requires the adjustment of the main fuel flow, injected through spray nozzles into the combustion chamber, thus controlling engine speed, and, consequently, the engine output thrust. Use of a simple throttle valve in the fuel line is not a practical control, however, because continual and extensive throttle readjustment would be required to maintain the engine speed at a desired value over wide ranges of atmospheric pressure and temperature and airplane speed to which the engine is subjected.

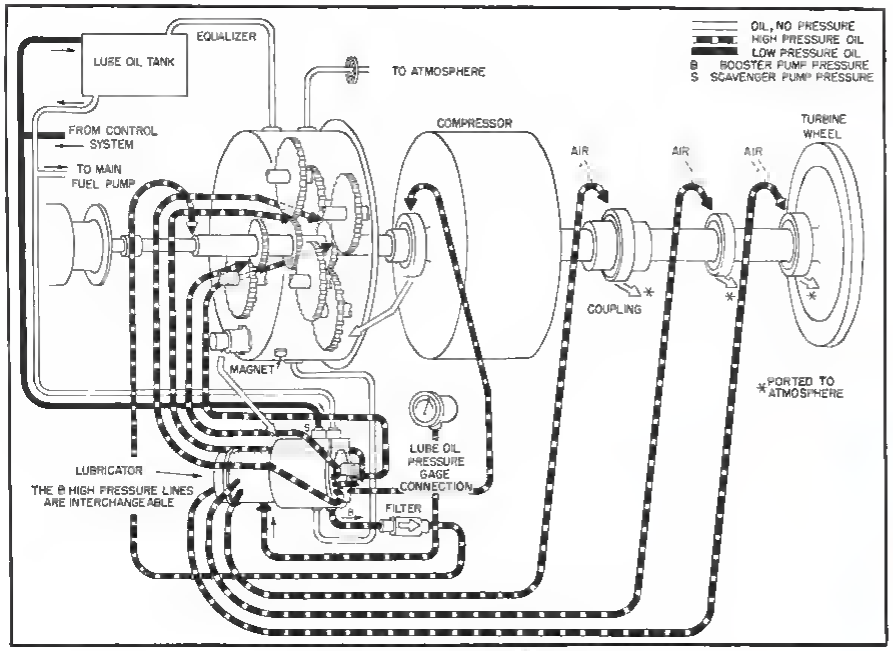
Required variation in engine fuel flow for the TG-180 is obtained with a variable displacement multi-cylinder piston-type fuel



Rear of accessory gear case, cover removed. Gears are (1) Hydraulic pump, (2) lubrication pump, (3) starter-generator, (4) tachometer generator, and (5) fuel pump. At (6) is seen spline to front of compressor rotor (full engine speed) and at (7) fuel control regulator gear bearing (gear removed)



Front view of TG-180, showing accessory arrangement. (1) Air inlet screen, (2) fuel inlet connection, (3) fuel pump, (4) high pressure stop cock, (5) engine control shaft, (6) fuel control regulator, (7) engine governor, (8) terminal box for starter-generator leads, (9) starter-generator cooling air inlet, (10) starter-generator, (11) hydraulic pump pad cover, (12) oil filter assembly, and (13) accessory piping "island"



Schematic Diagram of Lubrication System

pump. Variation of the pump displacement, and, consequently, fuel delivered to the burner nozzles, is achieved by a hydraulic plunger moving a wobble plate in the pump, varying the stroke of the pistons. Hydraulic pressure (variable control oil) is obtained from the fuel regulator, designed so as to maintain constant engine speed over the full range of aircraft operating conditions for each setting of pilot's control lever. Components of the fuel regulator are: (1) Shaft for engine control by pilot. Initial few degrees rotation opens the high pressure stopcock or fuel shut-off valve and permits low speed engine operation. Further rotation of shaft increases the engine speed by adjusting the mechanical setting of the governor, (2) mechanical engine-driven governor incorporated in the fuel regulator, to maintain constant the engine speed called for by pilot. This device varies hydraulic pressure delivered by the fuel regulator, and, consequently, the flow delivered by the fuel pump. Governor has positive adjustable stop at upper end of the speed range to protect the engine against rotating speeds higher than design speed, and (3) thermal units in the engine exhaust system which take over control from the governor and reduce the engine speed when exhaust temperatures exceed 1,300 deg. F., thus protecting the engine from excessive temperatures. These thermal units are not operative except under extreme flight conditions.

The fuel nozzles are of the duplex type, consisting of a small nozzle in each burner for low speed and for high altitude operations when low fuel flows are required, and a large nozzle operating in parallel when high fuel flows are required, automatically brought into play by a pressure-operated valve, or flow divider. Fuel used is ANF34 (aviation kerosene) or ANF28 (high octane gasoline).

▶ **Ignition and Starter Systems**—In starting a turbojet, it is necessary to increase the speed mechanically to such value that air flow is available for ignition of fuel and combustion. In general, at this low speed, and, consequently, low compressor discharge pressure, the turbine and compressor efficiencies are quite low. Hence, even after combustion has begun, it is necessary to use the starting motor to assist in accelerating the unit idling speed. When the engine speed, and, consequently, compressor discharge pressure, have increased sufficiently, the turbine and compressor efficiencies become high enough for the engine to operate satisfactorily without assistance from the starting motor, which may then be disengaged.

Components used for starting are:

(1) Starter-Generator. This is a direct coupled 24v. d.c. unit running at approximately engine speed. As a starter, it has a rating of about 12 hp. for short time. Under engine operating conditions it is a 400 amp. 24v. d.c. generator used for aircraft electrical power.

(2) Ignition coils and ignitor plugs. The two ignition coils are 400 c. transformers normally operated from the aircraft's a.c. power supply and producing approximately 20,000v. The ignitor plugs placed in two of the eight combustion chambers are similar in design to standard aircraft sparkplugs except that they have large spark gaps (about 0.100 in.) for positive operation. Ignition in the other six chambers is obtained by flame travel through the cross-ignition tubes.

Starting procedure is to energize the starting and ignition circuits, accelerating the engine to approximately 600 to 800 rpm. (firing speed). Upon reaching this speed, the speed-control shaft is advanced somewhat, opening the high pressure stopcock and allowing the fuel to spray into the combustion chambers, with almost instantaneous ignition. Engine speed is increased by further advancing the speed control shaft. At approximately 1,500 rpm. the engine has become self-sustaining, the starter load has become negligible, and the

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USE OF REX-FLEX STAINLESS STEEL FLEXIBLE TUBING *grows with the Aircraft Industry*

REX-FLEX Aircraft Application	RADIAL (Engines Per Plane) 1	2	4	6	8	JET TURBO	RAM
1. Wing de-icing ducting	✓	✓	✓	✓	✓	✓	✓
2. Pressurized cabin ducting			✓	✓	✓	✓	✓
3. Magneto and generator blast tubes	✓	✓	✓	✓	✓		
4. Internal combustion heater exhaust connections	✓	✓	✓	✓	✓		
5. Fire extinguisher flexible metal connections	✓	✓	✓	✓	✓	✓	✓
6. Cross ignition tubes						✓	✓
7. Flow dividers						✓	✓
8. Tail cone expansion assembly						✓	✓
9. Barometric control units						✓	✓
10. Duplex meter valves						✓	✓

Uses for Rex-Flex Stainless Steel Flexible Tubing grow with aircraft development because Rex-Flex has the basic elements of efficient aircraft design: *Laight weight, strength,* and *dependabtity*

As new aircraft designs have been produced, Chicago Metal Hose, through the science of FLEXONICS,* has provided Rex-Flex with proper characteristics for each specific application.

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starter, through a reverse current relay, begins operating as a generator to supply d-c power. No warmup is necessary, and the engine may be immediately accelerated to full thrust. Total time required to reach takeoff thrust from the moment the starter circuit is energized is approximately 75 sec. Ignition is required only during the few seconds needed to ignite the fuel, the circuit is then normally de-energized, although it is completely radio-shielded if operation is necessary without interference with the radio and radar operation.

Because of ram pressure effect of forward speed, an engine which is not operating will windmill at a substantial speed when the craft is traveling at high velocity. This makes it possible to start a turbojet at altitude by energizing the ignition circuit and advancing the speed control lever without energizing the starter. Successful air starts have thus been made at high altitudes.

To provide a continuous indication to pilot that the lubrication system is operating satisfactorily, the principal bearings are equipped with thermocouples and connected to the cockpit indicators. Thermocouples are installed in the exhaust system for cockpit indication of gas temperature.

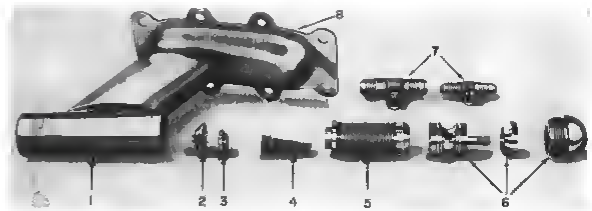
▶ Engine Mounting—Requirements for mounting a turbojet are to obtain sufficient strength to carry the design loads and to provide sufficient flexibility to compensate for deflection of the aircraft and the engine structure because of flight stresses and thermal expansion.

Provisions are made on the TG 180 for several mounting arrangements, the most common consisting of a three point mounting whereby the engine is supported by two main horizontal trunnions on the midframe, one of which permits radial movement to compensate for frame thermal expansion. The two trunnions are arranged to permit up-and-down rotation of the engine about the trunnion axis. Third support is a drag link incorporating a ball joint at either end and usually located at the top trunnion on the forward frame. This arrangement prevents up-and-down rotation of the engine about the trunnion axis but permits axial expansion of the unit.

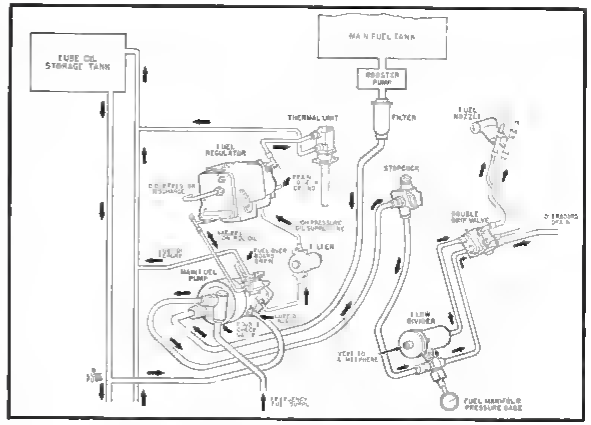
Design load factor of TG 180 is 8G's, with permissible ultimate of 12G's, without failure. This load has been simulated for certain critical assemblies by a factory test of the complete engine while operating at full thrust.

Fundamental Data
GE TG-180

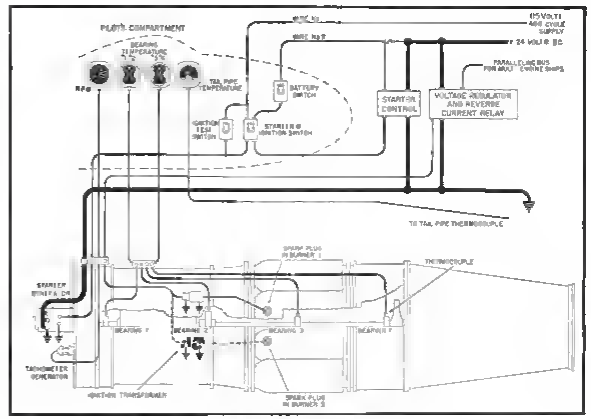
Maximum dia.—38¾ in.
Maximum length—168 in.
Weight (including all accessories)—2,388 lb (ev.) 2,450 lb (guaranteed max.)
Thrust (15 min takeoff and military rating)—4,125 lb (ev.), 3,750 lb. (guaranteed min.)
Rpm (takeoff and military)—7,760
Exhaust gas temp.—1,250 deg F (max.)
Thrust (max. continuous rating)—3,420 lb. (ev.)
Sfc. (lb /hr /lb thrust)—1.026 (ev. cruise)
Fuel—Gasoline (ANF28) or Kerosene (ANF34)
Lubricant—3806 hydraulic fluid or 1065 engine oil



Details of fuel nozzle. (1) nozzle body, (2) metering orifice large slots (sea level and high speed), (3) small slots (altitude and idling), (4) porous bronze filter for small slots, (5) wire screen filter for large slots, (6) nozzle assembling parts, (7) fuel inlet connections on cover plate, and (8) cover plate.



Schematic Chart of Fuel and Control Oil Line



Electrical System Diagram

KAISER ALUMINUM

HOW PERMANENTE METALS—IN A SINGLE YEAR—HAS BECOME A KEY FACTOR IN AMERICAN INDUSTRY—PRODUCING 175 MILLION POUNDS OF KAISER ALUMINUM!

One year ago, for the second time in over half a century, a new force stirred the aluminum industry.

After careful planning and organization, The Permanente Metals Corporation—led by Henry J. Kaiser and associates—started to carve out a permanent place in the aluminum world.

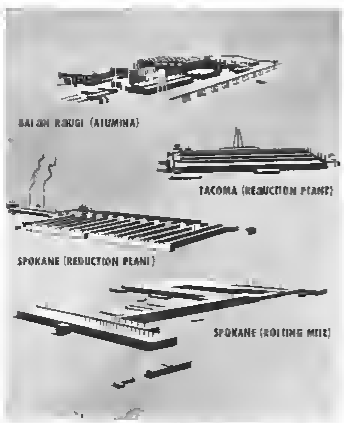
The first objective? To produce aluminum in tremendous volume and thus offset the shortage which was then crippling the production of finished products.

That this objective was achieved . . . and surpassed . . . is revealed by one statistic—175 million pounds of plate, sheet, and strip aluminum in the first year. Almost as much as the entire industry produced in the most productive year before the war!

The pictures and text on these pages *partially* reveal how this was done.

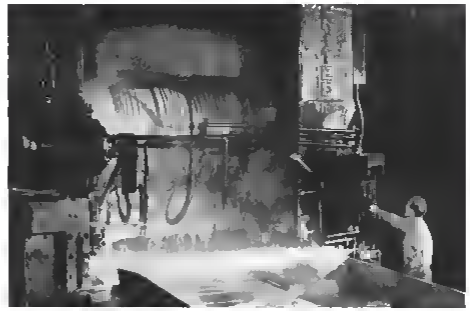
What they cannot hope to portray is how administrative vision, technical skill, and a completely coordinated operation combined to make such production possible.

This same combination is now achieving Permanente Metals' second objective—to make Kaiser Aluminum already second to none, the finest in the land!

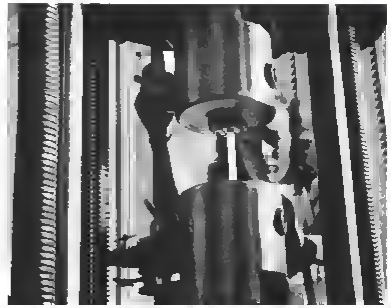


1 From bauxite processing to finished product—This chart gives a step-by-step picture of Permanente Metals' aluminum operations . . . which controls the production of quality aluminum from its huge bauxite processing plant at Baton Rouge, Louisiana . . . through its mammoth reduction and finishing plants at Spokane and Tacoma, Washington. Such integration assures fast, reliable service.

2 Preparing the 'pig'—Operating eight modern pot lines, Permanente's reduction plants at Spokane and Tacoma, Washington, can turn out over 700,000 pounds of pure pig aluminum daily. This pig aluminum is then sent to the rolling mill, also in Spokane, where it is converted into alloyed ingots and then rolled into plate, sheet and strip.



3 Down the 'hot line'—Permanente Metals' 53-acre Spokane rolling mill is one of the largest, most modern plants of its kind in the world. An example of its up-to-the-minute equipment is the "hot line," the giant rolls which convert alloyed aluminum ingots into sheet. This rolling mill is capable of producing 265 million pounds of Kaiser Aluminum a year.



4 Quality first—With production reaching new peaks, Permanente Metals is now concentrating on producing the highest quality aluminum ever offered to manufacturers. Constant chemical and physical tests plus infinite care in handling assure that customer requirements are not only met, but exceeded!

5 Ready to go—Here is the result of just one day's rolling mill production of Kaiser Aluminum. Ready to ship, it will go into aircraft, buses, building materials, house trailers, appliances, garage doors, kitchen utensils . . . will be welcomed by scores of America's leading manufacturers who rely on Permanente Metals for quality aluminum, fast dependable deliveries, and an eagerness to be of service!

Ready to serve you—*today*...

Kaiser Aluminum

a Permanente Metals product

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Monowheel Gear In Volmer VJ-21

Prospects favor unorthodox landing device improved during year of flight tests.

Contrary to a prior announcement, Volmer Jensen's Volmer VJ-21 two-place plane will retain its unique monowheel landing gear

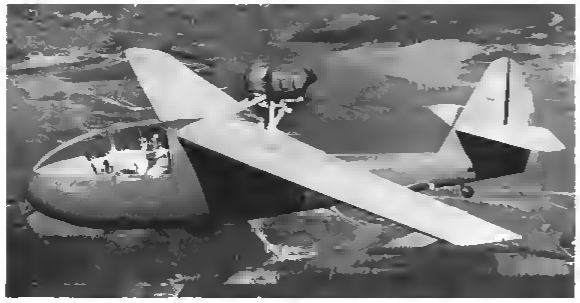
In forming Volmer Carsow Airplane Corp of Los Angeles to promote development of an all metal production model of the prototype, officers of the company stated that the plane would be redesigned for a tricycle landing gear At that time it was believed a conventional landing gear would be mandatory, that personal aircraft buyers would never accept the monowheel design

Now, however, officers say that potential buyers have expressed themselves so positively that the original landing gear concept has been readopted in projection of the commercial plane now being financed

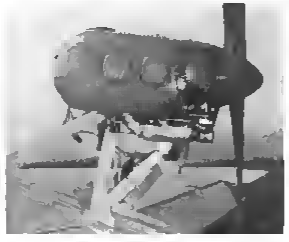
While it is impossible to say at this time that Jensen's design, a development of the single wheel landing gear that is "conventional" for some models of gliders and soaring planes, will be a trend marker in personal aircraft production, it nevertheless justifies careful consideration

▶ **Theories Demonstrated**—During the year that the experimental VJ 21 has been in flight, several of Jensen's theories favoring the monowheel design have gained practical demonstration

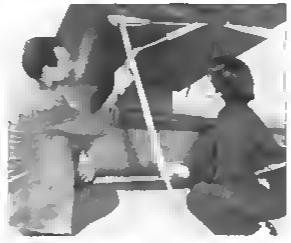
- The low CG of the plane and single main wheel contact with the ground have facilitated 'pasture" and rough ground landing and taxiing that would not be practical with light aircraft equipped with conventional gear;
- Ability to lower one wing and maintain substantial aileron control up to the termination of landing roll has enabled pilots of the VJ-21 to make successful crosswind landings that normally would be indicated only for aircraft equipped with castering landing wheels;
- Taxiing is unusually flexible through ability of the plane to turn on its main wheel through 360 deg by use of propeller blast on the rudder with the wheel brake locked Normally, however, to avoid excessive wear on the tire, Jensen executes a tight tax turn by moderate application of the brake and allowing the wheel to track a circle of approximately 3 ft (Accompanying photographs show clearly the placement of the wheel, carried in a central fuselage well directly behind the cabin and somewhat ahead of the centers of gravity and lift).
- Because the plane has a ground clearance of only a few inches it can be allowed to pitch forward on its glider type nose skid to effect an abnormally short roll in an 'emergency" landing
- Steerable Tailwheel—Technically, while this landing wheel performs the bulk of work, the Jensen arrangement probably should be called a "quadrawheel" gear, for a small steerable taxiing wheel is carried beneath the empennage, and spring loaded retractible arms attached to the wing of the point of separation of flaps and ailerons carry small wheels supporting the wind during taxiing



Volmer VJ-21, Incorporating Latest Changes.



Closeups shows simple mount for Continental C-75 engine Builders say mount has strength factor considerably in excess of CAA requirements



Wing wheel of VJ-21 extended for landing and taxiing Hydraulic cylinder retracts gear along under side of wing between flap and aileron

As an ultimate precaution against wing damage, should the wing wheels fail to release or the pilot neglect to lower them before or after landing contact, lips of the VJ 21 are fitted with light weight aluminum scuff caps

Plans for the proposed commercial model call for integration of wing wheel release latch, now actuated by a cockpit lever, with the main wheel brake so that the wing wheels will lower automatically the moment brake pressure is applied Retraction of wing wheels is by manual hydraulic pump

▶ **Strong Engine Mount**—Mounting of the VJ-21 power plant is simple and rugged, the builder claiming a strength factor considerably in excess of CAA requirements Thrust line is such that the aircraft has shown no tendency to nose down or climb to power on and off applications

Production model wings will be built of Dural, having a modified NACA 2418 foil at the root and 4612 at tip Fuselage and empennage will also be of Dural construction Standard equipment will include air speed indicator, altimeter compass starter, battery, oil temperature and pressure gages, fuel pressure gage, Delco Remy starter and generator, Sensenich propeller, Reading battery, and two way Ranger radio

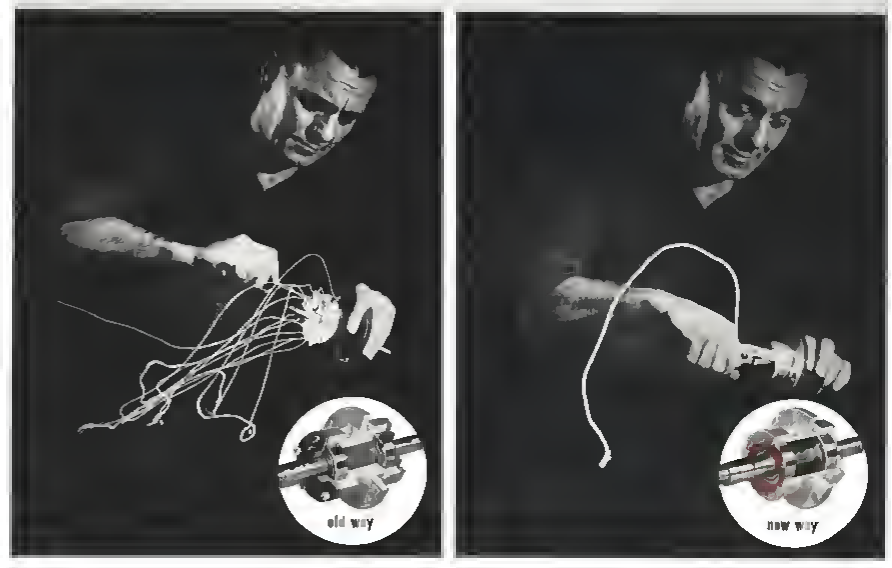
Production model specifications

Span	38 ft
Length	23 ft
Height	7 ft. 6 in
Wing area (inc ailerons)	145 sq ft
Aileron area	9 sq ft
Gross wt.	1,200 lb
Empty wt	800 lb
Useful load (inc 16 gal gas and 1 gal oil)	500 lb
Wing loading	9 lb /sq. ft
High speed	118 mph
Cruising speed	100 mph
Stalling speed (without flaps)	50 mpm
Stalling speed (with flaps)	45 mph
Climb at sealevel	750 fpm
Service ceiling	15,000 ft
Max range	300 mi

New Schweizer Sailplane

Described as the first U S-built sailplane in the "super-performance" class, the all metal Schweizer Model 121 is scheduled to make its first appearance in competition at the National Soaring Contest, now in progress and continuing until July 20, at Wichita Falls, Texas The first of several 121's to be built, owned by Richard J Comey, of Cambridge, Mass., manager of the Soaring Society of America, was to be flown in the Wichita Falls competition in attempts to better the international glider distance record of 465 miles, now held by Russia. The 121 has a 51 ft wingspan, an exceptionally thin wing, and has shown cruising speed as high as 90 mph in initial test flights at Schweizer Aircraft Corp's plant at Elmira, N Y. It carries water ballast in wing tanks which can be jettisoned

See for yourself how Truarc slashes assembly time, cuts costs



2 MINUTES vs. 2 SECONDS!

Right before your eyes is visual proof of how much assembly time can be cut. Each of the many light streaks in the first photo traces another time-taking arm motion, increasing fatigue and reducing efficiency. In the second photo, one Waldes Truarc Retaining Ring replaces six screws and a collar. The assembler uses one tool—a pair of Truarc pliers. The single light streak means one arm-motion. Less time is required for job-training, because Truarc guarantees accurate relationship of parts regardless of the skill of the assembler. Truarc means lighter weight, less bulk. Production and maintenance men find Truarc Rings cut labor and material costs wherever they're used. Their unique taper design assures constant circularity. Their never-failing grip does a better job of holding machine parts together.

There are different Truarc rings for different applications. see what can be done for your product. Send your drawing to Waldes Truarc Technical Service Engineers for individual attention, without obligation.

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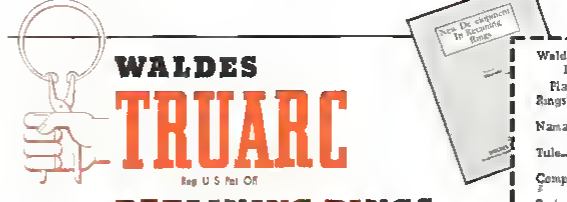

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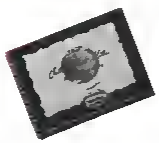
WALDES TRUARC RETAINING RINGS ARE PROTECTED BY U. S. PATS. 2 310 960; D.165,404; 2 410,560 AND OTHER PATS. PEND

H_2O for the J-33 in the P-80-B

A Problem this EEMCO Motor Helped Solve

Water injection in the J-33 turbo-jet engine in the P-80-B "Shooting Star" increases take-off and climb performance materially. Achievement of these advantages demanded a water injector motor with a lot of power, but in a small package. Lockheed put it up to EEMCO. The result was a 4.15 hp. *explosion-proof* motor with integral gear box, weighing only 15 pounds. A radio noise filter completes the unit. Here is a typical example of outstanding results when tough problems in custom-built motor design and development are put up to EEMCO.

EEMCO D 289 water injector motor, showing mounting bosses cast integrally with frame. Castings are of heat treated aluminum with Rosan inserts used. Motor, 27 volt DC; output speed, 3750 RPM, 3 minute duty cycle



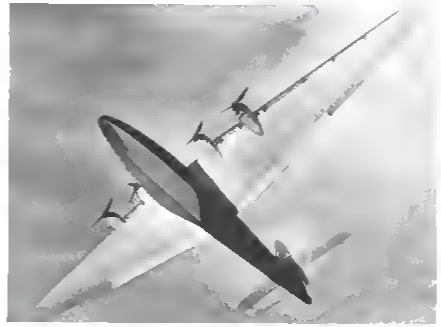
NEW EDITION READY

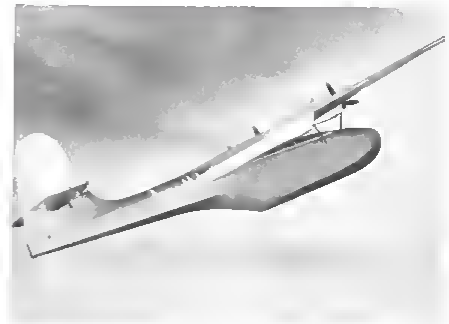
"Custom Built Motors for a World of Needs" was prepared especially for design and project engineers, and all executives concerned with product design and engineering. Please send request on your company letterhead.

ELECTRICAL ENGINEERING and MFG. Corp.

4606 West Jefferson Boulevard • Los Angeles 16, California

EEMCO





PLANING TAIL HULL

Exclusive pictures of new planing tail hull developed by NACA at Langley Field hydrodynamic tunnels. Model at left shows V-shaped planing surface at tail and steep, well faired single step. Model at right shows small hull area (in white) that rests in water affording up to 50% drag reductions over conventional hulls. Leading edge slots are not representative of full scale design but are used to achieve properly scaled wing lift effects of full size flying boat.

Baumann Brigadier Makes First Flight

Baumann Aircraft Corp "Brigadier" twin engine personal cabin plane and light transport made its first test flights at Metropolitan Airport, Van Nuys, Cal., last week. J. B. Baumann, designer and president of the company, reported good control and flight characteristics throughout the initial flight and in a subsequent test flight two days later the only difficulty experienced was in oil cooling expected to be corrected through louvres now installed to direct air flow around crank cases of the plane's two 125 hp. Continental engines.

▶ **Cruising Speed 150 mph**—The plane is designed for a cruising speed of 150 mph. and in first flights, with gear down and propellers turning at 2,150 rpm. as contrasted with designed cruising of 2,350 rpm., the Brigadier showed an indicated speed of 125 mph. Pilot on the test flight was B. F. Baumann., cousin of the designer, who said that no unusual control characteristics resulted from the pusher mounting of propellers at the wing trailing edges.

Distinctive structural feature of the plane is its mounting of the propeller bearing boxes on Lord mounts giving the effect of floating rubber suspension of drive shafts.

▶ **Near Accident**—A near accident accompanied the first test flight when the pilot obtained emergency clearance to land with oil overheating and came in down wind and into the approaching landing of a P-51 national guard fighter. Baumann gave the Brigadier full power and hedge hopped over the Mustang, landing successfully after another circuit of the field. The plane's oil cooling problem was not unexpected in that the engines are not equipped with oil coolers. The designer is confident that installation of oil coolers will not be necessary.

Beman Will Leave Lockheed Staff

Ward W. Beman, Lockheed Aircraft Corp.'s chief aeronautical research engineer, will resign within the coming month. Lockheed, undergoing a far reaching reduction of its engineering staff, is understood to have "accepted" a resignation handed in by Beman last January.

Beman, who in nine years with Lockheed gained national recognition as an aeronautical research authority, told AVIATION WEEK that he will make improvements in technique the foundation of a business he intends to launch shortly with William Bell and which will be identified as "Telecomputing Engineering Company."

PRESIDENT TRUMAN'S NEW AIR OFFICE

First photo of exterior of "The Independence," Douglas DC-6 which will be used by chief executive, shows special marking comprising American eagle design—light brown beak on nose, blue head, and blue feathers and stripe.


This Sign...
AT MORE THAN A THOUSAND LEADING AIRPORTS, ALL OVER THE UNITED STATES, SAYS "LAND HERE FOR ALL YOUR FLYING NEEDS!"
Firestone
AIRCRAFT TIRES & ACCESSORIES
GO
TO YOUR Firestone AIRCRAFT DEALER ... FOR
SHIP BY AIR
GO BY AIR
EXTRA VALUES IN AIRCRAFT TIRES AND ACCESSORIES

New Service Offered Foreign Equipment Buyers

New concepts of 'red carpet' treatment for foreign purchasers were revealed last week by Pacific Airmotive Corp at Burbank, Calif., as part of its expansion program in the increasingly important export field.

When a foreign government or airline representative advises PAC of his arrival he is immediately assigned the service of an export department representative whose sole duty is to assist the customer from arrival to departure. When the visitor arrives he finds hotel and transportation accommodations made, if an interpreter is needed, one is available. He is told on arrival that Pacific Airmotive stands ready to arrange a single credit that if PAC is unable to completely fill his needs from its own inventory it will arrange purchases from other dealers and include charges under a single letter of credit so the customer gains the added advantage of having all purchases shipped through a single customs office from one place.

On a tour of sales rooms, shops and engineering offices the visitor finds specialists ready to advise on problems peculiar to his buying needs, even to the extent of laying out a complete overhaul base. In planning rooms he finds ready for use scale models of all tools and equipment normally required for an airline operation, and engineers ready to present a visual display of the best method of installing American made maintenance equipment in the space indicated by the buyer.

Final step in the program is arranging if necessary for training natives in PAC shops. The industrial relations department will work out with the visitor complete training courses, will assign instructors and in most cases, arrange for housing foreign personnel who may be sent to this country. To further strengthen permanent ties, the visitor learns he can purchase PAC manufactured overhaul and repair tools, such as propellor governor test benches, magneto test equipment, propeller blade straighteners, hydraulic test units, etc.

Stan Wilson, service sales manager, told AVIATION WEEK he believes it inevitable that extension of world markets will dictate as in the case of his own company, revision of export selling methods. "No longer can we be content with only our domestic markets," he declared, 'nor can we simply open up showcases and hope foreign buyers will find what they want. If we are to maintain the manufacturing supremacy of the United States aviation industry, we must be prepared not only to show what we have to sell but to demonstrate how it can be used in helping the buyer improve his airline operation economically. Today our customers come to us from halfway around the world in three days and tell us they have to put an airline in operation in three months. Only by a form of intensive and personalized service such as we are now using can we hope to satisfy such customers and be reasonably sure that in years to come they will return with repeat orders for American products."

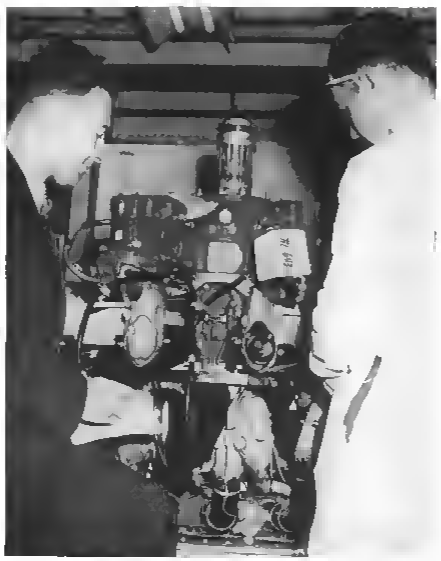
Navy Orders Radar

Navy will install a new lightweight (150 lb.) airborne navigation radar in all four engine NATS transport aircraft. A production order for 100 sets (APS-42) goes to Houston Corp., Los Angeles.

The new radar will have a scanner mounted on the plane nose for 220 degree coverage of terrain ahead or under the fuselage for a 360 degree coverage. Five inch cathode ray tube scopes will be mounted in both pilot and co-pilot's positions. A special 12 in. scope will be mounted in the radio operator's compartment for use in long over water navigation.

Using this set it is possible to detect land masses up to 100 miles away. Radar beacons now being installed on both coasts and a transcontinental route are visible in the airborne scope up to 225 miles away.

STAN WILSON (LEFT), PACIFIC Airmotive Corp service sales manager, demonstrates carburetor flow test bench to Raymond Cano, superintendent of maintenance for Aerovias Reforma, Mexican airline, as part of PAC's "red carpet" service for foreign buyers



AL THUOTTE (LEFT), OF PACIFIC Airmotive serves as guide, instructor and interpreter for Roger Poirier (right) during latter's training on American aircraft in Burbank, Calif. At end of training period provided by PAC, Poirier will head Air France mainte-

A Honeycomb "Sandwich"  *helps*

4800 DRAFT HORSES BECOME *RACE* HORSES

Convair 240 is fast and fleet footed. Already more than 160 have been ordered by domestic and foreign airlines. It is the first commercial transport to use auxiliary jet exhaust thrust for added speed. Other features include air conditioning, heated wings to prevent ice; pressurized cabin and reversible pitch props. Honeycomb is used throughout for flooring and shelving.

Consolidated Vultee's new Convair 240 was designed for speed. Two 2400 h.p. engines carry 40 passengers at a cruising speed of 300 m.p.h.

With that passenger load, engineers were naturally dead-weight conscious. One way they saved many important pounds was through the use of Weldwood* and Armorply Honeycomb.

This new structural "sandwich" is extremely light. The core weighs less than 4 pounds per cubic foot, and the strength/weight ratio of the finished "sandwich" is amazingly high.

Honeycomb core can be made from many materials . . . impregnated cloth, paper, Fiberglas or others . . . depending on requirements. Facings can be decorative or utilitarian, too . . . fine decorative veneers, aluminum, stainless steel or plastic.

Armorply and Weldwood Honeycomb is available in stock sheets, contoured panels or other semi-finished forms to meet your specifications. Get full engineering data on this remarkable material. Write today.

*TM Reg. U.S.P.C.

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Flight Instruction System Commences National Campaign

Californian is recruiting 400 schools and 400 sales personnel to begin $225 course promotion

By SCHOLER BANGS

Can 2,500,000 new aviation students be found, nationally, within the next 12 months and each sold a $225 flight course?

After studying promotional ideas since V-J Day in 1945, a Los Angeles flight school planner believes he has discovered the way to do it and has set up the organization to attempt it.

He is Robert Pike, who has incorporated National Flight System, Inc. and this month is launching a national campaign to establish 400 NFS dealers to sell the system flight course and accredit as many, or more, already established flight schools as flight instruction centers for NFS students.

Pike lost money in fathering his original program. Pacific Pilots, Inc., regained it with organization of a new California Company, Pacific Pilots Plan, Inc., and now, profiting from previous mistakes, feels that success is assured.

Here's how it works:

A broker is assigned in a given territory to canvass potential "distributors," who will sell the system to prospective flight students for established flying schools whose owners signify interest in acquiring an NFS franchise.

When a distributor has been selected the NFS representative effects a meeting with heads of the franchised flying schools (not more than one operator is franchised on any one airport) to work out details of the schools reception of students signed up by the distributor and his sales forces.

Once the student has been sold his course the school operator completes the contract providing the student with a "packaged" offering of eight hours of instruction, 26 manual lessons in navigation, meterology, theory of flight, engines, and personal aircraft maintenance, low club rates for aircraft rental after the student has learned to fly, certain cross country flight privileges, discounts on airplane purchases, advanced technical training if desired, and an offering of post-graduate home study courses and employment service.

As was the case in the Pacific Pilots, Inc. organization, the National Flight System offers as a basic inducement to the flying school operator assurance that all of his student sales efforts are taken off his

ROBERT PIKE

shoulders and placed in the hands of the NFS distributor.

NFS goes farther in providing the accredited operator with complete school courses, attractively printed and carefully prepared, and all printed school forms necessary for conduct of his business.

Similarly, NFS provides distributors with all of their office "paper work" needs: sales accounting, and office supply manuals and kits, and an advertising manual, plus specialized advertising post cards and street car card posters.

In short, National Flight Systems acts as an instrument for setting up distributors and flight operators in business, provides the pattern for a painstakingly-developed student aviation course, and subsequently supervises the interrelationship of its distributors and operators.

"Essentially the parent organization is a service and coordinating company and our profits come from royalties received from volume business generated by the 'packaged' flight course we have developed," Pike explains.

His estimate of being able to establish 400 distributors in business within twelve months is based upon the success, since activation last summer, of Pacific Pilots Plan, Inc., now an NFS distributor in California and on aviation and general market surveys.

Results of the past year in California confirm estimates of a national potential of approximately 2,500,000 students.

What percentage of such a potential NFS can expect to generate, and capture, the NFS president can't estimate.

But, he does say this:

"We know from experience that a carefully established distributor will have no less than 20 sales a month, while a big distributor, in an area of high density population will show from 200 to 300 sales per month. This indicates that in twelve months we will be showing an annual sales average ranging from 96,000 to 1,440,000 students."

Pike, who has established headquarters at Gardena Airport, near Los Angeles, is assisted by Bob Gunnell, director of field service, and Miller Dunckel, director of distributors' appointments.

He believes that in two years of ups and downs of experimental flight plan development in California he has rid his present plan of the business "bugs" that brought failure to his original company.

"Originally we went to finance companies for support of our contract paper, a serious mistake. Rates were exorbitantly high, and we wound up with freezing of all accounts receivable and a $20,000 deficit when we reorganized as Pacific Pilots Plan, Inc. last July, and established bank connections under which contracts were turned over to the bank for collection immediately upon writing," Pike recalled.

"Also, we originally tried to own our own planes, as was described in AVIATION NEWS in 1945. This was a mistake and WE lost heavily on it. We learned that we could not successfully divide our attention between administration duties and those of a flight operator.

"We discovered by trial and error types of advertising that were wasted effort, and those that pay handsomely. For example, when we placed between 300 and 1000 advertising cards in Los Angeles streetcars carrying the words "Learn to fly—only $15 a month" and a cartoon of a cow with forelegs outstretched and floating through the air as a passing robin exclaimed "It's her third lesson with Pacific Pilots Plan" we got from 25 to 50 replies a month. But when we attached to the car card two stapled pockets containing cartoon embellished business reply cards postage prepaid, our inquiries soared to 1000 a month and sales accordingly."

In the past two years a variety of prices for the flight course "package" were tested before the present $225 price was established as one assuring reasonable profits and being acceptable to students as well.

As tested in California, the plan has produced a ratio of 40 percent women and 60 percent male students, whereas the national average is 1 to 17 percent women.

Aeronca Offers Plan For Flying Clubs

Four plans for starting flying clubs for group ownership of training airplanes are provided in a new illustrated booklet distributed by Aeronca Aircraft Corp., Middletown, Ohio, entitled "How to Form an Aeronca Flying Club."

Basic down payment figures for purchase of a plane by a club of 20 persons, who finance the plane on the standard one third down, 12 months balance at 6 percent interest arrangement, range from $40 per person for a $2,400 plane, to $50 per person for a $3,000 plane. In addition, each person would pay monthly dues of from $9.16 to $11.19 for the remainder of the airplane's cost.

▶**$2 Per Hour**—This would make it possible for each participant to have use of the plane at $2 per flying hour for gas, oil and maintenance. The booklet allots $1.25 an hour for gas and oil and the remainder for maintenance and, in most cases, a major overhaul after 500 hrs. of operation, the plan states.

A second plan calls for outright purchase of the plane by a 10-member club with initial payment by each member of from $240 to $300 for his share in a $2,400 to $3,000 plane. With this arrangement monthly payments would cover only insurance and hangar rent at from $4.05 to $4.56 a month per person and the same $2 an hour for flight time.

▶**Industrial Club**—A third plan for a 20-member industrial club suggests that the employer may be willing to finance the plane on a 12-month non-interest bearing loan which the employes could pay off at monthly installments of $12.02 to $14.78 depending on the airplane price.

Most economical of the suggested plans from the standpoint of the club member is a fourth proposal which would provide for the employing company to buy the plane as an employe recreation facility and resell it for $1 to the 20-member employe flying club. Such an arrangement would provide for monthly dues of $4.02 to $4.78 depending on airplane price, and the $2 an hour operating fee.

All four plans assume that hangar rent is $20 a month, that insurance is purchased at $10.25 a hundred, and that services of a competent instructor can be obtained for from $2.50 to $3 an hour. The last plan takes into account depreciation of the plane at 20 percent a year, while the other plans do not consider this factor.

CAP Radios

Wisconsin's Civil Air Patrol Wing has received 60 two-way radios from War Assets Administration for use in a statewide wave network for emergency or disaster use. Stations will be established in 45 communities, some will operate two sets.

NO. 15 IN THE SERIES, FEATURING PROMINENT ESSO AIRPORT OPERATORS

ANOTHER AVIATION EXPERT PREFERS Esso

"because I like to have things right..."

says J. Wayde Stewart
owner of Stewart Airport Company
Parkersburg, West Virginia

"Because I like to have things right, I am an ESSO Aviation Dealer.

"I know that I can sell ESSO Aviation Products with confidence that the quality is right and that it will always remain that way. I know the ESSO dependability because I have known ESSO Products for years.

"ESSO Aviation Dealer service is right, too. And that is also important. Because of it, I can give my customers attention that will keep them coming back for more. To a great extent the future of private flying is going to depend upon smooth servicing of private planes.

"These things together with the enormous and well earned customer acceptance of the ESSO name are the reasons for my choice of ESSO."

Signed: J. WAYDE STEWART

J. WAYDE STEWART got his start in aviation in 1923. Although too young to accept a commission, he attended Officers' Training School at Chanute Field in Illinois. In 1932 he started private flying and in 1936 bought the Parkersburg Municipal Airport.

Mr. Stewart has been Treasurer of First Region, National Aviation Trades Association, conducted Civilian Pilot Training programs before the war and War Service Training programs during the war with one of the largest schools in the country. He is also distributor for ERCOUPE in West Virginia—Kentucky—Ohio and dealer for North American "Navion."

J. Wayde Stewart, knowing aviation from the ground shops to the planes in the air, prefers Esso Aviation Products . . . because he likes things RIGHT . . . and knows he gets *right service* backed by *right quality* and *right aviation research* with ESSO AVIATION PRODUCTS!

Failure to Detect Stalls Found Pilot Problem

Inability of experienced pilots to recognize approaching stalls is a far more serious factor in aircraft accidents than has been heretofore appreciated, according to preliminary evidence already collected in a continuing flight research program involving use of the recently perfected safe flight stall warning indicator.

Findings in the program thus far, conducted under National Research Council sponsorship indicate that few private pilots tested thus far can detect the stall while even licensed commercial pilots and instructors are far from infallible.

▶ Professors Report—Prof. R. J. Hulon of Harvard University and Prof. Floyd Dockerey of Ohio State University reported to the recent Washington meeting of the Committee on Selection and Training of Aircraft Pilots, a unit of NRC, that their flight research, using an Aeronca Champion at Harvard and a Piper Cub J-3 trainer at OSU, showed very similar results, indicating:

- The average student or private pilot with 15 hr. or more past solo does not recognize a stall.
- Many instructors do not know stalls and therefore are unable to identify them to students.
- Some pilots in all grades, approach a stall condition in their normal flying.

The tests are being conducted with five of the stall warning indicator wing installations on one wing set for progressive actuation. Each wing indicator is wired to a light on a panel in the check pilot's cockpit. As the plane approaches the stall the indicators light the panel in series. After all five lights flash on, the plane actually stalls.

▶ Pilot Errors—One pilot, making his final turn on landing approach, lighted four of the five lights at a point where recovery was almost impossible if he had actually stalled. And some pilots showed more lights, while flying normally, than when the check pilot told them to put the plane into stalling condition deliberately.

Further flight research will seek to determine how stalls may be identified in instruction and what effect the use of an unfamiliar airplane has on the pilot's stall perception. It is planned to use a Taylorcraft Army surplus L-2 liaison plane for pilots who have been flying the Cub and the Champion, since it has different stall characteristics from either plane.

Dr. Hugh Dehaven of Crash Injury Research Unit, Cornell Medical College, New York City, suggested at the meeting that investigation was needed on other probable factors in stall accidents, pilot panic when a stall is indicated at low altitude, and pilot inattention to cockpit instruments such as might occur when he is checking a navigation point.

FIVE STALL WARNINGS

All phases of an aircraft stall, from the time it is approached until the stall is fully developed are indicated by these five stall warning indicators, put on an Aeronca at Westchester County Airport, New York, as a part of a research program for CAA. Educational Research Corp., of Cambridge, Mass., which is conducting the program using several planes so equipped at various airports, seeks to determine how accurately the average student, private and commercial pilot can determine when a stall is about to happen. Indicators are products of Safe Flight Instrument Corp., White Plains, N. Y., and are arranged to light lights on a check pilot's grading board, as the pilot progresses through various stages of a stall.

NATA Heads Plan Recruiting Tour

President Beverly Howard and Executive Director Harry Meixell of National Aviation Trades Association will make an air tour within the next few weeks to visit state operators associations which have not yet affiliated with their organization, it was announced after a recent meeting of the NATA Board of Delegates.

Howard and Meixell will visit operators in Ohio, Minnesota, Kansas, Kentucky, Wisconsin, Mississippi and Tennessee in an effort to point out advantages of joining the national Federation of state operators associations along with the 30 states which now have member associations. Representatives from 23 of the 30 member states attended the recent delegates meeting in Washington.

Proposal for coordinating some Washington services of NATA and Aeronautical Training Society, including circularization of a common Washington newsletter to both memberships, was sanctioned at the NATA meeting, and was passed on to an ATS committee for action by the large flight school operators. If approved, the newsletter it is understood, will be edited by Wayne Weishaar, secretary-treasurer of ATS.

Tennessee Sponsors Maintenance Clinic

A one-day course for training aviation mechanics and maintenance men in newest methods and equipment for engine and aircraft maintenance and repair is being opened by the Tennessee Bureau of Aeronautics at 10 a.m. July 15 at Tri-City Airport, Johnson City. At the same time on successive days the course will be conducted at other airports in the state on the following schedule: July 17, Knoxville Municipal Airport; July 22, Lovell Field, Chattanooga; July 24 and 25, Berry Field, Nashville; July 28, McKellar Field, Jackson; July 29, Tom Stewart Field, Union City, and Aug. 1, Memphis Flying Service, Memphis.

Following manufacturers of aircraft, engines and accessories have indicated they will send factory representatives to explain their service and repair methods: Continental Motors, Aircooled Motors, Aeromatic Propellers, Aeronca, Piper, Bellanca, Stinson, North American Aviation, Beech, Cessna and Luscombe.

The one-day "refresher" course has been scheduled in an effort to insure more efficient maintenance at Tennessee airports, with a view to decreasing accidents as well as lowering operation costs on Tennessee airplanes.

Charles Ragland, chairman of the State Aeronautics Bureau, said the course would fill out the Bureau's multi-sided program of aviation training which began when it pioneered in the civilian pilot training program, training of women pilots, promotion of flight training for high school students, and flight training for state police officers. He predicted that other states would follow Tennessee's lead in conducting similar courses for mechanics and maintenance men with help of factory representatives.

Esso Co-pilot

A directory of all airports which market ESSO (Standard Oil Co. of New Jersey) aviation products, is being distributed free by the ESSO Aviation Division, Sales Department. R. C. Oertel, manager, has announced. Titled, "The ESSO Co-pilot", the booklet also contains detailed information as to the fields listed, their services, air mileage charts, traffic signal code, weather symbols and terminology and Civil Air Regulations.

Radio Distributors

Three New York State aviation companies have been named distributors for General Electric Company's personal plane radios and other aviation electronic equipment as it becomes available. The distributors: A. R. O'Donnell Co., Roosevelt Field, New York; O'Connor Aircraft, Albany Airport, Waterviet; and Buffalo Aeronautical Corp., Buffalo Municipal Airport.

Device Uses Radio To Light Airport

CAA studying invention to control field illumination by pilot in flight.

A device making it possible for a pilot to turn on the lights of an unattended field by pushing a button in his plane has been developed by a Texas radio engineer and is being studied by CAA. CAA approval of the system could carry with it re-designation of a field so equipped as a mechanically attended field available for use after dark.

Inventor is Vernon L. Mallory, Mineral Wells, Tex., who, in 1937, made a night landing at an unattended field. Two years later he had completed his first working model which was tested successfully for three months at Stinson Field, San Antonio. Mallory obtained a patent on the development in 1943 and recently has resumed promotion of his system after being discharged from the army.

▶**Little Additional Equipment**—Only additional equipment necessary in an airplane would be a small box about four inches square and weighing about 20 ounces, tied in with the ordinary transmitter. Any regular radio frequency can be used. When the button in the plane is pushed, it transmits a tone to receivers on the ground which convert it to an impulse that operates switches turning on the lights. Transmission on this tone does not interfere with other use of the radio, such as communication or range reception.

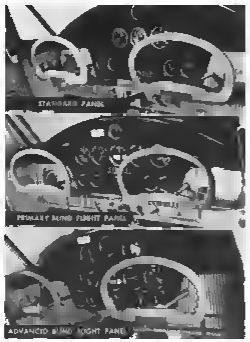
Modification of the transmitter in the plane could be made for from $5 to $10 by any qualified radio mechanic with technical details furnished by Mallory. With his main interest in production of the ground equipment, Mallory says that if the system found widespread use he would endeavor to persuade radio manufacturers to incorporate the necessary components in their plane transmitters.

▶**For Unattended Airports**—Main market for the Mallory system would be small airports which are unattended at night. Until some determination of the potential market has been made, Mallory is reluctant to estimate a price for the airport equipment, although it is likely it would be under $1,000. One of the major assets of the equipment is that in addition to operating the field lights, it would give the airport a radio receiver usable for ordinary reception with the addition of a speaker.

The system requires two receivers on the ground, the second one being employed to make it impossible for static to turn on the lights. The system is connected to both boundary and runway lights. Pressing the button the first time lights up the boundary lights. A second impulse turns on the runway lights. A switch is connected to the wind sock or wind tee so that the runway lighted will be the proper one. If the wind indicator is not already lighted, the Mallory system would incorporate a light for this which would also be turned on to indicate the wind direction. In case of wind moving between the runways, the system would light both runways, indicating that a cross wind landing is necessary.

▶**Automatic Cutoff**—The system is equipped with an automatic cut-off. The lights remain on for a set period of from anywhere from three minutes to an hour.

Mallory has already demonstrated his latest model to a CAA regional lighting conference in Fort Worth, and has been discussing applications of the system with CAA officials in Washington. He has a tentative agreement with an airline to test the equipment in one of their planes with an airport in Texas suitably equipped. The airline is interested in the device as an emergency safety feature. Mallory looks upon his invention as being primarily useful for private flyers.



THREE VOYAGER PANELS

Choice of three instrument panels standard, primary flight group or advanced gyroscopic panel is being made available as factory installations on Stinson Voyagers and Flying Station Wagons. The new panel installation plan is designed to save customers time and money and provide neater and more efficient installations for pilots desiring additional equipment. All panels have two way radio. Standard panel has compass, airspeed indicator, altimeter, time recording tachometer, oil pressure and temperature gauges, fuel gauge and ammeter. Primary panel substitutes sensitive altimeter for standard instrument and adds clock, turn and bank indicator, and rate-of-climb. Advanced panel adds directional and attitude gyros, and direction indicator replaces compass. All three panels have rheostat controlled backlighting.

Subnormal Eyesight Seen No Bar to Flying

Thirty percent of a student pilot group with sub-standard eyesight scored flight training grades above the average of a comparable group with normal eyesight in recent flight research tests at Ohio State University.

Dr. M. S. Viteles, Chairman of the National Research Council's Committee on Selection and Training of Aircraft Pilots, reported on the tests, conducted with a group of 194 young men over a three year period. He disclosed at a Washington meeting that 38 percent of the students with vision below standard CAA requirements were "washed out" in training, while 17 percent of the normal vision students were failed.

Flight experience reports of the students since completion of the course has shown no significant differences between the two groups in spite of the vision differential. Most of the flyers report occasional "tough moments" in approaches and landings, although no accidents have been reported.

The Viteles report was in addition to previous data on the Ohio State visual acuity flight tests disclosed several weeks ago.

Findings of the data are likely to result in revision or liberalization of present visual acuity medical requirements for CAA private pilot licenses.

Republic Cuts Orders to Equalize Inventories

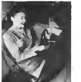
Republic Aviation Corp. has curtailed some orders with suppliers to bring inventories into line with revised production schedules, company spokesmen told AVIATION WEEK.

They emphatically denied that the Seabee program had been abandoned, stating that the parts order reductions had undoubtedly given rise to widespread rumors to that effect. As further evidence that the company was not getting out of the personal plane field they cited the recent appointment of Dan M. Parker, Jr. as director of personal plane sales.

Dusters Display

A three day program on advanced techniques for aerial 'bombardment' of insects, plant bacteria and other crop pests will be conducted at Stillwater, Okla. North Municipal Airport, Aug. 7-9 in conjunction with the second annual convention of the National Flying Farmers' Association at the Oklahoma Agricultural and Mechanical College, Stillwater.

Experienced commercial operators will give flight demonstrations of aerial dusting and spraying with insecticides, fungicides, weed killers, and aerial distribution of seed and fertilizers. Planes and equipment used will be available for inspection.



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take a chance...

● More than 35,000 lives have been saved with Irvin Type Air Chutes. Now Irving offers the sensationally new Custom-Built *Chair* Chute . . . a chute that makes flying decidedly safer . . . a chute with these important features:

1 SIMPLICITY . . . You don't need special training to use the Irvin *Chair* Chute.

2 CONVENIENCE . . . You don't have to carry the *Chair* Chute around or store it . . . it's always in your plane . . . in the back of the chair . . . ready for instant use

3 COMFORT . . . You don't have to "wear" the *Chair* Chute . . . either in or out of your plane . . . except in an emergency

4 SAFETY . . . The *Chair* Chute can be buckled on in a jiffy in an emergency . . . and you are ready for any eventuality.

Custom-Built *Chair* Chutes are available . . . now . . . for every type of cabin plane . . . large or small. Many well-known companies and individuals are installing these new *Chair* Chutes in their planes . . . for added protection in flight Write for circular and full particulars about this new kind of protection for the plane you own or plan to buy

There are now over 35,000 registered members of the Caterpillar Club. Should you qualify, please write us

FEEL SAFER . . . BE SAFER . . . with IRVIN Custom-Built CHAIR Chutes

Illustrations show Irvin Custom-Built *Chair* Chutes installed in Beechcraft, Stinson, and Ercoupe planes The chairs have the same beauty and comfort as deluxe airplane seats . . . plus the "built-in" safety of an Irvin Chute *Chair* Chutes do not take up extra space . . . cost little . . . are easily installed. Get them for your plane.

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IRVING AIR CHUTE CO., INC.

1671 JEFFERSON AVENUE, BUFFALO 8, NEW YORK

Pacific Coast Branch: 1500 Flower St., Glendale 1, Calif

BRIEFING FOR DEALERS AND DISTRIBUTORS

FLYING & FISHING—Other flight school operators who include seaplane training in their course of study can take a tip from Dade Aviation, Tamiami Airport, Fla which is mixing fishing with its multi-engine seaplane training in a Grumman Widgeon Ed Turner, co-owner of the flight school, takes the student out for some practice approaches, landings takeoffs, and single-engine procedure, then stops the plane in the middle of Lake Okechobee to fish a while "The fishing period helps the student relax and prepare for more training later in the day," Turner says Some students prefer swimming to fishing and they can do that, also How time is logged wasn't made clear

PRIVATE FLYING TO MEXICO—San Diego County Airport Owners and Operators Association is sponsoring private plane flights to Mexico each weekend this month with inspection service available at Lindbergh Field, San Diego, from 10 AM to 6 PM Sunday A charge of $60 is required by government regulation for Sunday inspection The operators' group has guaranteed payment of this fee each Sunday, but individual pilots will pay a customs and immigration fee of only $3 The international flights were arranged to prove to government the need for a full-time customs inspection service at Lindbergh Field

VJ-21 LIAISON APPLICATION—The VJ-21 lightplane, with single main wheel recessed in bottom of fuselage glider-fashion, was demonstrated to Wright Field officials recently at Dayton Municipal Airport, by Jean Reimer, former Wasp, while John Carssow, president of the Volmer-Carssow Aircraft Co, Los Angeles, was talking to Dayton Chamber of Commerce officials about possibility of locating a plant in Dayton, if AAF likes the plane for observation-liaison purposes Production version will be all-metal, although demonstration prototype has fabric and plywood covering

START FLYING NOW—Airplane dealers and operators who haven't received announcement of the Continental Motors Corp "Start Flying Now" campaign will miss a chance at a good tie-in with a national promotional campaign, unless they write to Continental's Advertising Service Dept, 415 Association of Commerce Bldg, Grand Rapids, Mich The engine manufacturers is distributing free mats for a series of advertisements in local newspapers, appealing to the public which has a hankering to learn to fly, but hasn't done anything about it—yet Specimen slogans in the advertising series "You've always been interested in flying why not start now? You'll wonder why you put it off so long" "Have you been up lately?" "It used to take all day—now you're home by noon," "A personal plane is a useful farm machine." The mats contain blank spaces for insertion of the local dealer's name location and airplanes handled. Continental emphasizes that the operator need not handle Continental powered planes in order to obtain the free mats Each ad contains a coupon, which readers are asked to send to the local dealer indicating interest in learning to fly The dealer's part consists in buying local newspaper space and a following up inquiries resulting from his local ads "We believe," a Continental spokesman explains "that selling methods that work in other fields can be applied successfully to sale of flying lessons and rental and sale of planes They may be even more effective because up to now in this industry they have not been very widely used"

ONE-THIRD EX GI'S—Survey conducted by Lockheed Aircraft Service, Inc, at its two American bases at Burbank, Cal, and MacArthur Airport, Sayville, L I, shows that of 1,233 employes checked, more than a third are veterans of World War II, and in many cases the jobs now held by the veterans closely parallel their occupations while in the service Both bases have contracts for work on army and navy transport planes, and domestic and foreign operators of two and four-engine planes

RE-FINANCING FOR ROCKET?—Reports from Ft Worth say the Johnson Rocket which has been dis-associated from the Johnson family for some time, may go back into production with some new financing, but that it will not have any connection with the Texas Engineering & Manufacturing Co at Dallas

RUNWAY DEDICATION—Los Angeles County is inviting local airport owners to "dedicate" their runways for public use, as a means of combatting rising airport tax charges Rezoning of airports in the county as industrial areas, subject to industrial zone tax rates, is blamed for a decrease in the number of landing areas from 57 airports in 1929 to only 28 at present County officials have offered to apply for use of state aviation gasoline tax money to maintain any such runways that may be dedicated to the public It was reported that Grand Central Airport in Glendale, with an assessed valuation of $975,000, has a tax bill this year averaging more than $5,000 a month, while Lockheed Air Terminal will be paying $4,000 a month taxes on runways with assessed valuation of $700,000

Alexander McSurely

Solar Parts Orders Up

Solar Aircraft Co., San Diego, has received orders for over 2,300 stainless steel C-54 exhaust manifolds, manifold parts for the Consolidated Vultee PB4-2, and sheet metal components for jet engines Total of the new business is over $700,000

LET'S GO!

Just drop this card in the mail with your name and address and find out how easy and inexpensive it is to win your wings through National Flight System. Plenty of new planes on airports everywhere!

WHY WAIT—THE POSTAGE IS PAID!

Name ____________ Age ____

Telephone No. ____________

Street ____________

City ____________ Zone ____

MAIL THIS CARD TODAY

REPLY CARDS

Using business reply postcards like this one attached to streetcar ads in Los Angeles. Pacific Pilots Plan managed to get 1,000 mailed inquiries a month, from which much flight instruction business was developed Similar promotion will be used in various localities as National Flight System gets into operation

New Airport Construction

Proposed Work

Camp Campbell Ky—RUNWAYS—U S Eng, Bldg. T-7 Gravelly Point Va, rein con runways $2,800,000

Cleveland Ohio—LABORATORY—Nat. Adv Comm. for Aero Municipal Airport, heat testing laboratory $1,750,000

Huron S D — AIRPORT IMPRVS. — City voted bonds, municipal airport imprvs $870,000

Camp Hood Tex—RUNWAYS—War Dpt, Bldg T-7 Gravelly Point Va rein con runways $2,750,000

Galveston Tex—ADMIN BLDG—Herbert Y Cartwright mayor plans by Charles H Zwiener 219 Cotton Exchange Bldg, brick administration bldg concrete fdn. $155,000

Bandon, Wash.—LANDING STRIP—State Aero Comm 305 Second Ave. Bldg, Seattle, emergency landing strip $103,700 R L Nuber c/o owner engr CAA Bids this year

Lester Wash—AIRPORT—State Aero Comm 305 Second Ave Bldg, Seattle airport. $118,000 R L Nuber proj engr Bids this year

Low Bidders

Alton, Ill.—AIRPORT IMPRVS.—Ill. Dpt. Aero 803 S. 7th St., Springfield concrete apron grading drainage sodding seeding clearing etc Alton Civic Memorial Airport, from Madison Constr Co Box 252 Edwardsville $371,384 N C Baird Springfield cb engr

Champaign Ill.—AIRPORT LIGHTING SYS—Univ of Ill Champaign lighting sys of U of I Airport, State Proj FWA 10 (1) (L) from Champaign Asphalt Co, 1202 N Oak St $55,041

Chicago, Ill.—TAXIWAYS—City, Dpt. P Wks. City Hall concrete airplane taxiways, bituminous surface course, Chicago Municipal Airport, from American Asphalt Paving Co, E 97 and S. Torrence Sts. $347,650

Andrews Field, Md—HANGAR—U S Eng 1st and Douglas Sts Wash. D C. Butler type hangar from Baltimore Contractors, 711 S Central Ave Baltimore $192,385

Industry's Lowest Freight Rates Offered in Slick Airways Tariff

San Antonio operator undercuts certificated competitors by more than 7 cents a ton mile; Low level of charges seen as blow to other independents.

By CHARLES ADAMS

Undercutting the proposed new rates of its certificated competitors by more than 7 cents a ton mile Slick airways, the nation's largest airfreight carrier, has published the lowest cargo tariff ever filed with CAB

The San Antonio operator's disclosure that it will offer an average rate of 12¾ cents a ton mile effective Aug 1 may prove more of a blow to other independents than to the 19 or 20 certificated carriers which last week were slated to file a consolidated tariff at a 20 cents a ton mile level Some uncertificated airfreighters had hoped that Slick would join them in submitting to CAB a uniform tariff calling for a 14½ or 15 cents a ton mile average rate

Slick Loads a Link Trainer

► **No Further Drop**—Few observers look for either another drop in the certificated airlines' freight rates to meet Slick's level or an attempt by most of the other independents to match the low rate Cargo officials of several certificated carriers believe Slick cannot make money at 12¾ cents a ton mile with C 46E equipment

Any effort by the certificated airlines to push their freight rates below the proposed 20 cents level probably would be met by a renewed cry from the independents that mail payments are being used to subsidize cargo As the independents see it the scheduled domestic airlines have failed to make money while getting the equivalent of 50 cents a ton mile for passengers and anywhere from 45 cents a ton mile (Eastern United, TWA and American) to over $15 a ton mile (Northeast) for mail

► **Slick Criticized**—This being the case, the independents profess to regard even the 20 cents a ton mile cargo rates of the certificated passenger carrying operators as "out of line" with other charges

As a contract carrier Slick has been criticized bitterly by other independent airfreighters for holding cargo rates down to "uneconomic levels" Some quarters believe the rates proposed by Slick for its common carrier operations, together with the lower charges contemplated by the certificated lines mark the beginning of the end for small independents using C 47s

► **Former Rates Given**—While the certificated carriers' proposed Aug 1 tariff represents a reduction of about 25 percent from their current 26 5 cents a ton mile level, Slick's new rates show little change from those in effect during the past six months Slick's average cargo income after reaching a low of 11 cents a ton mile last fall has been 13 cents a ton mile since February

Under its new tariff, Slick's charges are only 15 to 25 percent higher than those for rail express Its highest rates are still 66 percent below air express, which moves at an average of 61 4 cents a ton mile

► **CAB Action Sought**—Slick filed its tariff in anticipation of early CAB action on its request for common carrier rights under Section 292 5 of the Board's Economic Regulations This section makes active airfreighters eligible for common carrier privileges until CAB decides on route applications submitted before last May 5

By the beginning of last week, CAB had not issued a letter of registration under 292 5 to any all cargo line With the recent addition of Flamingo Air Service, Avon Park Fla, and Air Cargo Transport Corp, N J, the group of applicants under 292 5 has grown to 13

► **Railway Express Move**—Meanwhile, Railway Express Agency is trying to have its exemption broadened to permit shipment of its air express over all-cargo lines qualified to operate as common carriers under 292 5

Important features of the new Slick tariff

- **Regular service** to nine "principal points"—Los Angeles, San Francisco, Dallas, San Antonio, Chicago, Detroit Newark New York and Philadelphia (Regular service has been suspended temporarily at two other principal points—Houston and St Louis) In addition, Slick plans to serve 152 "demand points" whenever these places have shipments aggregating 1,000 lb or more
- **Regular rates** range from about 18 3 cents a ton mile for small shipments to 11 5 cents a ton mile for large loads, compared with a 33 cents to 14 cents range for the scheduled airlines
- A "**deferred freight**" category under which shipments can be made for less than 9 cents a ton mile Deferred freight is described as shipments accepted by the carrier for transportation at its convenience Deferred rates are 70 percent of the regular rates on shipments up to 10 000 lb Competitors assert Slick will 'break its back' on the ultra low deferred rates
- **Tariff table setup**, which provides for successively lower rates at 100 lb, 1 000 lb, 3,000 lb and 10 000 lb volumes, will encourage freight forwarders and consolidators to ship via Slick The certificated airlines' tariff will not have sufficient volume break points suited to forwarder operations
- **Premium commodity rates** ranging up to 180 percent of the regular are charged on cattle, baby chicks, uncrated furniture, garments on racks, extra heavy pieces weighing over 2 000 lb, corpses, etc
- **Pickup and delivery rates** of 50 cents a hundred lb and $1 minimum are the same as those proposed by the scheduled airlines at the larger cities.

Expensive Reading

Participants in CAB's freight forwarder case who want to buy a complete transcript of the hearing which has been underway for nearly five months will have to dig deeply

By July 4 transcript of the hearing —longest in board history—totaled 8,193 pages At 30 cents a page, interested parties could purchase the record for $2 457 90

The proceedings started in New York Feb 17 shifted to Washington March 24 to Chicago April 14, Oakland Cal May 12, and back to Washington June 16 One hundred and eighty witnesses had appeared before Examiner J Earl Cox by the beginning of last week. End of the hearing within another ten days is predicted

A noteworthy advance in the lubrication of aircraft engines—big and small

AEROSHELL OIL D

HERE IS AN OIL MARKED "AIRCRAFT" THROUGH EVERY STEP OF MANUFACTURE . . . AN OIL THAT CAN IMPROVE ENGINE PERFORMANCE AND CUT OVERHAUL FREQUENCY. IT'S ON SALE NOW

To AIRLINE OPERATOR and small-plane owner alike —Shell Research now brings an oil that promises to establish new criteria for engine efficiency and engine maintenance cost

It took years of testing and literally dozens of "combinations" to arrive at new, compounded AeroShell Oil D. Finally one combination—a blend of new fortifying agents with the finest of aviation-grade base stocks—proved what was wanted:

Greatly reduced deposits of lacquer and carbon throughout the engine. Virtual elimination of sticky lacquer deposits on oil screens. Reduced oil consumption, because of less deposits in oil ring grooves and drain holes. Improved mechanical condition of piston rings, and longer service from exhaust valve guides. Better protection from corrosion during engine shutdown.

In laboratory engines, then in actual flight tests, these qualities of AeroShell Oil D have been confirmed again and again. And in engines of all sizes, AeroShell Oil D has succeeded not only in improving performance, but also in appreciably lengthening periods between overhauls. Now AeroShell Oil D, a thoroughly proved new oil, is ready for you.

SHELL

FINER FUELS FOR THE AGE OF FLIGHT

SHELL AVIATION FUELS · AEROSHELL LUBRICATING OILS, GREASES AND FLUIDS

Edo Floats and Aeromatic Propeller

. . . a combination that clicks on the Super Cruiser

"With the Koppers Aeromatic propeller, the Piper Super Cruiser is one of the best seaplanes I have ever flown!"

So declares Henry Kent, former Pan American Airways pilot and now in charge of aircraft sales for Wiggins Airways in New England. His testimonial is typical of the high regard in which the Super Cruiser seaplane, equipped with Edo Model 2000 floats and the Koppers Aeromatic propeller, is held by operators and private owners throughout the country.

The Aeromatic automatic variable pitch propeller installation has been fully ATC'd for the Super Cruiser floatplane. Properly adjusted and operated, it can cut take-off run and time by as much as 35 per cent and can increase rate of climb by as much as 20 per cent, besides adding appreciably to cruising speed. Under normal operating conditions, the Aeromatic equipped Super Cruiser at full seaplane gross weight, can clear a 50 foot obstacle in approximately 1800 feet.

Lightplane owners have long been aware of the three-place Super Cruiser's versatility . . . its adaptability to any kind of pleasure or commercial operation. Now, with the Edo floats-Aeromatic propeller combination giving it such satisfactory performance, it will win even greater popularity. Call your Piper dealer for details today!

For optimum performance from the Super Cruiser floatplane with Aeromatic installation, it is important to have a correctly adjusted propeller. The same model F 200 propeller with blades model 74 E, for the land plane is used but with added counterweights. The engine should turn 2600 r.p.m. at full throttle in flight at sea level. If in doubt, check your Aeromatic representative for advice.

Aero matic*

*REG U. S. PAT. OFF.

Koppers Company, Inc.
Aeromatic Propeller Dept.
Scott St., Baltimore, Md.

Edo FLOATS
FOR REAL FUN IN FLYING

EDO AIRCRAFT CORPORATION
College Point, Long Island, N. Y.

Atlantic Carriers Keep Fare Level

Trans Atlantic air fares will remain at present levels of about 9½ cents a mile until next March if the recommendations of 12 carriers flying U S Europe routes are accepted by their respective governments

Members of the North Atlantic Traffic Conference of the International Air Transport Association decided at their recent New York meeting to hold a special session Nov 17 to discuss rates for the remainder of 1948 By November the carriers hope to have ready a 12 month study of operations which will permit a better forecast of costs and the need for rate adjustments

▶ **Simplify Tariff**—Meanwhile, the conference voted to simplify its tariff structure for the carriage of goods by abolishing the present classifications of air freight and air express and establishing a single overall classification of air cargo To encourage volume use of air cargo over the North Atlantic the carriers will ask government approval of a 25 percent discount on shipments over 100 lb They also plan to set up specific commodity rates for certain types of goods to promote their shipment by air

A special subcommittee was named to discuss with the steamship companies the possibility of restoring prewar arrangements for interchange of sea air traffic Under such arrangements, it would be possible for a traveler in a single ticketing transaction to fly the Atlantic and have his heavy baggage shipped by sea, or to make one leg of his trip by air and another by sea

▶ **New Members**—Two new members, SABENA Belgian airline, and British South American Airways, were admitted as active members of the North Atlantic Traffic Conference at the New York meeting Other members are Air France, American Overseas Airlines, BOAC, Danish Airlines (DDL), Norwegian Airlines (DNL), KLM, Pan American Airways, Swedish Airlines (SILA), Trans Canada Air Lines and TWA The 12 lines carry an average of 6 000 passengers weekly across the Atlantic

CAB ACTION

The Civil Aeronautics Board

• **Dismissed All American Aviation's** application for helicopter routes in Philadelphia and Pittsburgh areas at applicant's request (Docket 2895)

• **Ordered Northwest Airlines** to show cause why its temporary mail pay for services from Seattle and Minneapolis to Anchorage should not be 68 cents a plane mile starting Jan 1, 1947 and for service westward of Anchorage to the Orient at 71 7 a plane mile after operations begin (about July 15)

• **Authorized TWA** to suspend service temporarily at Tripoli Libya.

• **Rescinded** orders authorizing **Empire Air Lines** to suspend service at Pullman, Wash.-Moscow, Ida., on AM 78 and authorizing **Monarch Air Lines** to suspend service at Gallup N M., on AM 78

• **Permitted Colonial Airlines** to inaugurate nonstop service between Washington D C and Scranton-Wilkes Barre, Pa and between Syracuse N Y and Ottawa Canada

• **Permitted Trans-Canada Air Lines** to serve Sault Ste Marie Mich through Kinross Airport.

SHORTLINES

▶ **American**—Inaugurated daily DC 6 service between Washington and San Francisco last week

▶ **American Overseas**—Reported week ended June 14 was biggest in company history with 1,556 trans Atlantic passengers carried, including 866 eastbound

▶ **BOAC**—Carried more than 8,000 passengers between New York and London during the year ended July 1

▶ **Colonial**—This month received a silver trophy from the Canadian Province of Quebec's Safety League for flying 17 years without a fatal accident

▶ **Delta**—Recently elected R W Freeman, New Orleans Edward H Gerry, New York City, Winship Nunnally, Atlanta, and Richard J Reynolds, Winston Salem, N C, as new members of its board of directors

▶ **Eastern**—Is enlarging its 36th st. terminal in Miami to more than twice the present size The $75 000 expansion will permit the terminal to handle up to five Constellations and 300 persons at one time

▶ **Pan American**—Has signed a contract with the Calavo Corp to fly between five and seven million pounds of avocados from Havana to Miami this summer DC-4s each carrying 20,000 lb, will make between 250 and 350 trips for the highly perishable $1,500 000 cargo . . . Weekly all cargo service between San Francisco and Manila was instituted this month with DC 4s

▶ **Scandinavian Airlines System**—Carried more than 2,300 passengers and nearly 300,000 lb of cargo to Europe during the first half of 1947 Eastbound load factor was 99 5% in June against 99 3% in May

▶ **Trans-Canada**—Inaugurated more direct, faster transcontinental service this month over its new Great Lakes airways which adds intermediate stops at Sault Ste Marie, Mich, and Fort William Port Arthur, Ont Carrier formerly flew a circuitous route north of the Great Lakes TCA has named Anson C McKim, Canadian member of the ICAO Council, as vice president in charge of administration

C&S Offers Discounts To Mid-week Passengers

Chicago and Southern Air Lines last week instituted 15 percent reductions on mid week round trip fares between selected pairs of cities on its system

To take advantage of the savings, a passenger must arrange his itinerary to travel on a Tuesday, Wednesday or Thursday on both the going and returning portion of his trip Tickets remain valid for 16 days from commencement of passage, and this discount is valid on the following runs: Chicago-Memphis, Chicago-Jackson, Chicago New Orleans, St Louis-Memphis, St Louis-Jackson, St Louis New Orleans, Memphis Jackson, Memphis-New Orleans, Jackson New Orleans and Houston Shreveport

PCA, Steamship Line Offer Packaged Tours

Eight day all expense vacations by plane and Great Lakes steamer are being offered on a credit basis by Capital Airlines (PCA) and the Detroit & Cleveland Navigation Co

The air water packaged cruises were to begin July 12 with PCA flying Washington, D C area vacationists to and from Buffalo N Y., terminal point for D & C's Great Lakes trips The credit plan provides for small monthly payments extending over a year PCA states it will offer similar tours originating at other points on its system if the initial trips prove successful

Nonscheduled Lines Get Letters of Registration

More than 260 nonscheduled air carriers, mostly small fixed base operators, have received letters of registration from CAB which will permit them to continue flying under section 292 1 of the Board's Economic Regulations

By early last week, 378 applications for letters of registration had been received by CAB The revision of section 292 1 which became effective June 10 provides that no irregular (nonscheduled) air carrier may engage in any form of air transportation after Aug 10 unless a letter of registration has been applied for

AOA Gets Bank Credits

American Overseas Airlines has completed negotiations for bank credits and term loans totaling $12,000,000 which will be used to purchase new equipment including eight Boeing Stratocruisers now on order

LAA Opening Set

Los Angeles Airways target date for opening service on part of its certificated helicopter air mail routes is between Oct 1 and 20 Carrier expects delivery on its first Sikorsky S 51 this month with three more to be on hand when operations start

CAB SCHEDULE

July 15 Hearing in Northeast Airlines mail rate case Postponed from June 30 (Docket 1933 and 1950)

July 16 Oral argument in TWA's mail rate case (Docket 2340)

July 16 Prehearing conference re Resort Airlines' All Expense Tours' Certificate Application. (Dockets 2377 and 2571)

July 28 Hearing in Chicago Helicopter Case Postponed from July 14 (Docket 2384 et al.)

July 29 Hearing in All American Aviation's mail rate case Postponed from July 21 (Docket 1906)

Aug 26 Hearing in case involving additional service in California-Nevada area. Postponed from July 17 (Docket 2019 et al.)

Sept 2 Hearing in Latin American Certificate Amendment cases of Panagra and Braniff. (Dockets 2027 and 2628)

Sept 8 Hearing on Mid-Continent's proposed service between Minot N D., and Regina, Saskatchewan (Docket 998)

Sept. 29 Hearing on Mid-Continent's application for alternate Kansas City New Orleans Route (Docket 1899)

Oct 7 Hearing involving additional Florida Area Service Postponed from Aug. 25 (Docket 1908 et al)

Nov 18 Hearing on Board's investigation of Consolidated Airfreight Tariff Agreement. (Docket 2719)

3 Mail Pay Cases Test CAB Policy

Indication of how far CAB will go in underwriting the unprecedented losses of the domestic airlines in 1946 and the first quarter of 1947 will be provided by three mail rate cases now before the Board.

TWA and Capital Airlines (PCA) are bucking the strenuous opposition of the Board's Public Counsel in asking for retroactive mail pay increases aggregating $16,451,000 for periods dating back to 1942. And United Air Lines this month became the second of the transport industry's 'big four' to join the sizable list of carriers seeking additional mail compensation.

▶ **Costs Soar**—Largest mail carrier in the country during 1946, UAL—like TWA, PCA, Chicago & Southern, Colonial Continental, Northeast and Western—has informed the Board that rates set during the war period are now inadequate because of soaring costs and smaller loads. Without naming a definite figure, United said its mail compensation of 45 cents a ton mile, which became effective Jan. 1, 1945, is "less than fair and reasonable" and should be increased "substantially" retroactive to Jan. 1, 1947.

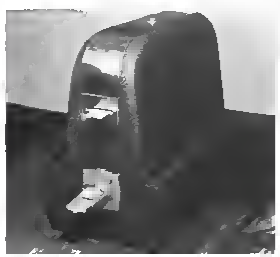
The PCA and TWA cases probably will be decided this summer with oral argument on the former proceeding held early this month and argument on the latter scheduled July 16. Public Counsel in both proceedings have held that the carriers' request should be denied not only because of the Board's well established policy that final mail rates in effect prior to the date of filing a petition will not be increased retroactively but also because the Civil Aeronautics Act gives no authority for such adjustments. PCA filed its petition Jan. 14, 1947, and TWA filed two months later.

▶ **Requests Listed**—TWA, which along with Eastern, United and American has been carrying mail at the non-subsidy rate of 45 cents a ton mile, is asking that its $3,541,000 compensation for the period Jan. 1, 1946 to Mar. 14, 1947 be increased over 300 percent to $14,698,358. PCA, which has a 60 cents a ton mile rate, wants an additional $5,294,344 for the period June 1, 1942 to Dec. 31, 1946.

Public Counsel in the PCA case have pointed out that granting the carrier's petition would establish a precedent authorizing retroactive review of all rates. This would convert CAB's present rate making policy into a cost plus (fixed fee) arrangement and destroy those incentives toward economy and efficiency that are inherent in prospective rate making."

▶ **Public Counsel's Position**—TWA had asserted that its need for a retroactive mail pay boost was the result of "unusual circumstances beyond its control such as the pilot strike and the grounding of the Constellations." But Public Counsel said that CAB, in setting rates, placed them high enough to allow for unforeseen difficulties and that it was the carrier's responsibility, not the Board's, to shoulder business risks.

In a petition supporting its request for retroactive mail pay increases, PCA informed CAB that it is "on the very threshold of bankruptcy" despite small operating profits in April and May. The carrier said its working capital is exhausted and its stockholders' equity "completed wiped out" as the result of inadequate mail compensation. PCA states it is now faced with the necessity of raising new working capital through issuance and sale of additional stock at a tremendous financial sacrifice.



FAST TICKETER

American Airlines will install this automatic ticket vending machine at high volume terminals throughout its system if tryouts now under way in the Boston ticket office prove its practicability. Filled with pre-printed tickets, the machine is operated when the agent puts in a slug and pushes the slide. The ticket pops out from the slot near the top. Only paper work the agent has is entry of trip date and time on the back of the passenger's part of the ticket.

Lipscomb Quits American

Willis G. Lipscomb, assistant vice president and general traffic manager of American Airlines, has resigned to become vice president in charge of traffic and sales for Pan American Airways. The PAA post formerly was held by V. E. Chenea, who resigned recently on the advice of his physician. (Aviation News, June 23)

Lipscomb

Walter Sternberg, American's director of passenger sales, has taken over Lipscomb's former duties with the title of general sales and traffic manager. General traffic manager of Eastern Air Lines until June 1946, Sternberg then joined American Overseas Airlines as director of international traffic procedures. He became AA's director of passenger sales last fall.

TWA Shakeup Hits Regional Staff

Another far-reaching reorganization of TWA, which centers the carrier's administrative setup in Kansas City and already has resulted in a number of resignations and job shifts, is under way with the approval of the company's board of directors.

Regional offices in New York, Chicago and Los Angeles will lose their status, with all administrative functions transferred to Kansas City. The offices themselves will be retained at the three cities.

▶ **Savings Seen**—President Lamotte T. Cohu said the reorganization will save TWA more than $1,000,000 annually.

Previously each regional general manager was in charge of all activities for his area. The shift will place the heads of the New York, Chicago and Los Angeles offices under E. O. Cocke, vice president in charge of traffic at Kansas City. The International Division under Vice president and General Manager Otis F. Bryan, also is reported to be involved in the reorganization.

Among the developments announced:

- Transfer of the International Pilot Training Division from New Castle, Del., to Kansas City, effective Aug. 1.
- Appointment of Harold D. Koontz as executive assistant to President Cohu.
- Dale Armstrong, assistant to the board chairman of Northrop Aircraft Inc., and director of that firm's public relations has resigned to take over direction of TWA's publicity.

In a move not connected with the reorganization, Hal Blackburn, assistant general manager of the International Division returned to flying the line as a pilot.

▶ **PCA Changes**—Meanwhile, Capital Airlines (PCA) also has decided to centralize its administrative setup. Eastern Region Vice-president R. E. Fell, Western Region Vice-president R. M. Averill and Southern Region Vice-president J. D. Effinn have been transferred to new positions. J. Raymond Bell, the carrier's public relations director, resigned effective Aug. 1.

CNAC Asks Permit

China National Aviation Corp., Shanghai, has asked CAB for a foreign air carrier permit to operate between Shanghai and San Francisco via Guam, Wake, Midway and Honolulu. Owned 20 percent by Pan American Airways and 80 percent by the Chinese Government, CNAC proposes to fly the route initially with DC-4s.

Feeder Changes Name

Aviation Enterprises, Inc., Houston, Tex., holder of a three-year feeder certificate, has changed its name to Trans-Texas Airways.

U. S. Exports by Air Reach Record Level

The steadily increasing volume of goods exported from the U. S. by air reached a new peak at the end of 1947's first quarter, with near-record levels continuing through April.

Both from the standpoint of value and weight, March, 1947, shipments totaling $87,839,000 and 3,663,000 lb. were considerably more than double those of the same 1946 month, according to the Commerce Department. The gain in March over February was 44 percent in dollar value and 41 percent in shipping weight. April air exports aggregated $17,016,000 and 3,502,000 lb.

▶ **Imports Lag**—Air imports, consistently behind exports during the postwar period, were $6,733,000 and 824,000 lb. in March. Dollar volume of imports rose to $6,864,000 and 851,000 lb. in April.

LaGuardia Field was the leading airport in value of air trade with 42 percent of all exports by air and 84 percent of total air imports during March. Miami led all other points in shipping weight.

▶ **Products Listed**—Each of seven product groups accounted for March air exports valued at over $1,000,000, wearing apparel, $2,600,000, machinery and vehicles (principally airplane parts and electrical machinery), $2,500,000, medicinal preparations, $2,300,000, furs and manufactures, $1,600,000, fountain pens and mechanical pencils $1,600,000, textiles other than apparel $1,100,000, and jewelry, $1,000,000. Principal air imports were watches and clocks, $3,003,000, furs and manufactures, $822,000, precious stones $643,000, precious metals $313,000 and medicinal preparations, $233,000.

The great bulk of our air trade is with other western hemisphere nations. Highest dollar volume in air exports during March was to Mexico—$2,773,000, followed by Brazil, $2,017,000, Cuba, $1,424,000, Argentina $1,201,000, Colombia, $1,144,000 and Canada, $471,000. In contrast, top $1,224,000, followed by Belgium, $889,000, rating European country was Sweden with Switzerland, $364,000, United Kingdom, $346,000 and France $288,000. Air exports to the Philippines totaled $503,000 and to India, $416,000.

▶ **Russian Trade**—Receipt of more than $3,133,000 in goods from Switzerland, including $2,997,000 in watches, clocks and parts, accounted for nearly half of this country's air imports in March.

Although the U. S. exported less than $1,500 in goods to the USSR by air during the first quarter of 1947, we imported items worth more than $528,000 including precious metals totaling $256,000 in January and $262,000 in March. During April air imports from Russia soared to $1,200,000, of which $1,135,000 was in precious metals.

WRINKLE-PROOF

Apparel salesmen are taking advantage of Western Air Lines new policy which enables them to take garment samples on flights as personal baggage. The service eliminates packing, allowing the salesmen to display unwrinkled samples immediately upon arrival. Stewardess Paula Betz is shown hanging apparel in a full-length wardrobe on a WAL plane.

SPEEDPAK IN SERVICE

Eastern Air Lines groundcrew attaches cargo-baggage carrying Speedpak on Lockheed Constellation on Newark-Miami run. In addition to increasing payload, Speedpak, developed by Lockheed, greatly speeds handling of baggage and cargo. (Acme photo)

Senate Restores CAB Cut

Senate Appropriations Committee has restored $605,000 of House-clipped funds to CAB's budget for the 1948 fiscal year.

The Senate committee boosted CAB's allocation from the $2,535,000 approved by the House to $3,140,000. Budget Bureau recommended $3,380,000. CAB's current year appropriation is $2,490,600.

Truman Asks More Funds for Mail Pay

A supplemental appropriation of $1,336,000 has been requested by the President to cover payments on an unanticipated volume of airmail carried during the last few months of the 1947 fiscal year.

The Post Office Department estimated airmail payment requirements for March, April, May and June on the premise that the volume carried would be approximately equivalent to that carried during January and February. The airmail volume for March, April, and May, however, was "far in excess" of the January-February level the President reported, and the indications are that the June volume will prove to be even greater.

Congressional action was completed last week on two bills carrying airmail appropriations.

1. The 1948 fiscal year Post Office Department bill provides $5,000,000 for foreign air mail transportation and $37,000,000 for domestic airmail transportation. The foreign airmail figure approved was $500,000 below the Budget Bureau's recommendation, and the domestic airmail allocation, $850,000 below.

2. The second urgency deficiency bill provides $33,377,000 for foreign airmail payments for the 1945, 1946 and 1947 fiscal years. The allocation will be used to pay carriers amounts due for foreign service under permanent rates to be set by the CAB. Carriers on most international routes have received payments based on temporary rates.

Travel Red Tape Under Investigation

Congress, commercial interests seeking means to lower paper barriers.

First concerted effort in the U S toward removing the mountains of red tape which have acted as paper barriers to the free flow of international travel for over two decades is now underway

Paper requirements — visas, passports health certificates, police reports, tax returns, etc — which discouraged steamship travel during the prewar years, now promise to cancel out the primary asset of air travel speed

Specific examples most dramatically demonstrate this

• It now requires 45 minutes to clear customs inspection in Mexico This, added to the two and one half hours consumed in clearing U S inspection equals half of the flying time between Los Angeles and Mexico City

• A total of 526 papers must be filled out every time an airliner flies from New York to Europe Each time a plane flies from San Francisco to Australia a total of 2,802 sheets of paper must be filled out to cover the movement In addition, visas, passports health certificates and photographs for crew members must be obtained

Both Congress and the Administration in conjunction with private interests, are trying to reduce such paper discouragement to international travel

▶ **Land Testifies**—At hearings before the Aviation subcommittee of the Senate Interstate and Foreign Commerce Committee, a score of outstanding experts, including Air Transport Association President Emory S Land, have called for immediate enactment of the Brewster resolution directing a review of legislation and regulations issued thereunder setting up requirements for international transit U S regulations on international travel now fill approximately 1 600 pages of fine print The subcommittee will act on the resolution, pointing to a simplification of procedure following a second set of hearings scheduled for mid July

A subcommittee on facilitation of international civil aviation of the Air Coordinating Committee has completed a 20,000 mile inspection tour of all major U S ports of entry "seeing the obstructions obstruct" according to the group's chairman, Harry Tarrington director of international activities service of CAA's Office of Foreign Operations Other members of the subcommittee, working with the air transport industry, include representatives of the State, War, Navy, Agriculture, and Post Office Departments, the U S Public Health Service, the Immigration and Naturalization Service, and the Bureau of Customs

▶ **Dollar Problem**—At the Senate proceedings Secretary of Commerce W A Harriman, Assistant Secretary of the Treasury Edward Foley, and Chairman Owen Brewster of the aviation subcommittee emphasized the importance of encouraging U S overseas travel so that American dollars will flow into foreign lands, permitting war-devastated areas to pay for urgently needed exports from the U S

With proper assistance, it was estimated that postwar U S international travel will mount to a volume of between $1 billion and $1 6 billion annually This compares with a peak volume of $693 million in 1929

▶ **U S to Blame**—Anticipating a major volume increase in overseas airline business once travel restrictions are removed, ATA President Land designated the U S as the most backward" nation in modifying the rigid regulations built up during the interwar years in a world atmosphere of nationalistic suspicion and isolationism He challenged Harriman's statement that the U S took a progressive position at the April meeting in Geneva of international experts to promote free flow of international travel

Land called for a "drastic" simplification of paper requirements to make it possible for the travelling businessman to leave this country by air on 24 hours notice At present, he pointed out, the minimum time required for persons located outside of Washington is one week. All passports must clear through State Department headquarters

▶ **Recommendations Given**—Land's overriding recommendation was a "change in philosophy" in the State Department "Instead of aiming to block travel, by applying numerous yardsticks to determine it 'unnecessary'," Land declared, "the Department must be brought to encourage travel" His three other key recommendations to the senate committee

(1) That the Immigration and Naturalization Service, with approximately 350 offices throughout the U S, be authorized to issue passports This would preclude the necessity of funneling business through the State Department in Washington

(2) That bilateral negotiations get underway immediately to eliminate visa requirements France and Great Britain already have negotiated such an agreement Land suggested that some type of temporary visa might be issued by the homeland of the traveller, permitting six months' stays in foreign lands He pointed out that U S citizens now must make appearances at the consulates of each foreign country they desire to visit—sometimes 100 or more miles distant—in order to obtain visas The time spent in this process, he commented is many times the time saved by air transport

(3) Examinations of the admissibility of travelers to this country should be conducted at points of embarkation abroad At present, visas issued by U S consular officers abroad do not assure admission into the U S U S airlines, considering themselves common carriers, Land related, pick up all passengers abroad with visas from U S consular officers but if a passenger is refused entrance into the U S, the airline conveying him to this country is liable to a $1 000 fine The carrier must pay all the passenger's expenses while he is detained in this country and make a fare refund

HORIZONTAL COMFORT

The "sleeperette compartment," soon to be introduced aboard planes in Pan American Airways' trans-Pacific service, features a new type seat which at the touch of a button becomes a full length lounge with a specially-designed head and foot rest To provide leg room, distance between sleeperette seats will be 60 in against 40 in for conventional seats, and DC 4s fitted with sleeperettes will carry 30 instead of 44 passengers The compartment can be completely enclosed by curtains When the seat is upright, the foot rest can be either unfolded into a table or pushed out of the way under the seat

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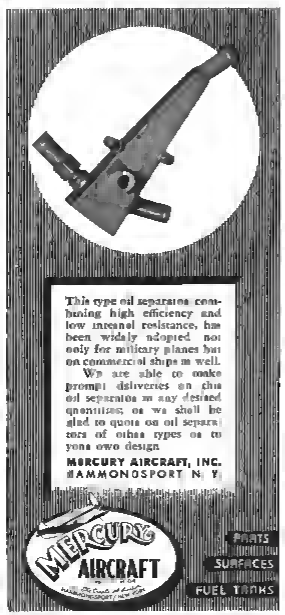

NEW PRODUCTS

Powerful Lightplane Transceiver

Model 802 Ranger Airfone, VHF transmitter-receiver, is single-package unit designed to bring new high power, range, and direction finding advantages to private and business plane owner. Maker is Electronic Specialty Co., Los Angeles, Cal. Featured are all six transmitting frequencies (122.1, 122.3, 122.5, 122.7, and 122.9 mc.) alloted to private flyers, including special international frequency channel of 121.5 mc. assigned to military and civil aircraft for use in emergency air contacts,

plane to ground contacts and direction finding. Seen of particular interest to plane owners is 1.5 to 2.0w transmitter output, approaching power of many airline sets. Both transmitter and two-band receiver, together with power supply, are contained in one cabinet measuring 4¼ in. by 5⅞ in. by 11¼ in. depth. Total weight is but 8 lb. 12 oz. Receiver portion includes 195-410 kc. band and 550-1,600 kc. broadcast band. Available for speaker operation is 4½w. output, insuring ample volume in planes not soundproofed. There is provision for headphones. Three position antenna switch makes possible installation of a direction finder loop, or use of regular antenna, or elimination of range signal during weather broadcasts from range stations by a choke type voice filter. A 20 in. quarter-wave mast is used for VHF transmitter.

Prefabricated Hangars

Illustrated here are prefab hangars being marketed by Washburn Mfg. Co., 1276 Princeton Ave., Trenton, N. J., photo show-

ing units installed at Worth Aviation Activities, Florence, N. J. Maker reports hangars are available on long term financing. Construction is of completely prefabricated factory section designed for bolted assembly at erection site. Company has been in production for two years.

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(Classified Advertising)

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AIRPLANES
EQUIPMENT
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SALES AGENCY—An opportunity to build a business of your own under the direction of a national aviation sales organization. Unusually high earnings possible. (Upwards of $1500 per month.) You must have sales ability, be willing to work hard and sincerely believe in the future of aviation. Sale of planes or equipment not involved. Five to ten thousand dollars required depending on the territories. A knowledge of aviation is helpful but you must not now be a flight examiner. Only one appointment open from each non-competitive aviation area. Give full particulars of your background and how you can be reached by telephone to arrange a preliminary interview. National Flight System, Suite 1212 A, 510 So. Broadway, Los Angeles 14, Calif.

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(Continued on page 66)

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RIVET · ANCHOR NUT · SCREW LOCK

Blind or Visible Attachment

Complete Installation in Seconds

1 Drill *ONE* Hole

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(Types with flat, flush, countersunk or spanner head. Sizes as required for metal thickness and hole diameter.)

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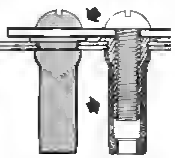

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(Continued from page 61)

FOR SALE

New BG-4HS8 Spark Plugs 75c each. Discount to dealers. Send for latest catalog. Kael Oil Dept 9P-18 York, Penna.

OFFICIAL PROPOSAL

Bids August 19, 1947 (100)

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Sealed bids for the leasing and operating of a public airport known as Linden Airport for merly known as the Eastern Aircraft Airport at Linden, N. J. located at U. S. Route 1 State Highway Route 25 and Stiles Street in the City of Linden, Union County, New Jersey, will be received by the Governing Body of the City of Linden at the City Hall Wood Avenue and Blanche Street, Linden, New Jersey, until 8 P. M. Eastern Daylight Saving Time on Tuesday, the 12th day of August, 1947 and then publicly opened and read. Bidders may obtain information for Bidders and Specifications and additional information from City Clerk, City Hall Linden, New Jersey.

Each bidder must deposit with his Bid a certified check made payable to the order of the City of Linden in the amount of $5,000.00 subject to the conditions provided in the Information for Bidders and Specifications.

No bidder may withdraw his bid within forty-five (45) days after the actual date of the opening thereof. The right is reserved to reject any or all bids to waive any informalities in the bids and to accept the bid deemed most favorable to the interests of the City of Linden.

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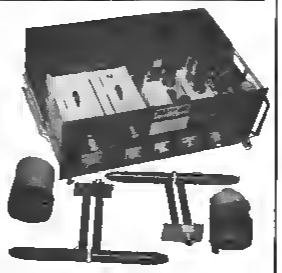

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EDITORIAL

Take Airports Out of Politics

Selection by the New York Port Authority of Hervey Law as director of its three major metropolitan airports is deserving recognition of a proven administrator. Mr. Law has an aviation background of 30 years. But he has built his reputation in airport management in hardly more than three, directing the third busiest airport in the country—Washington National.

Washington revenue has nearly doubled since 1943. Law has proved his contention, and that of other progressive business leaders, that an airport must capture a substantial part of its income from non-aviation commercial activities such as advertising and concessions. At the three New York air terminals—LaGuardia, Idlewild and Floyd Bennett, all in weak financial condition—continuing this business philosophy will be vital.

Despite his outstanding fiscal record, however, Law's appointment carries an added significance to aviation. Municipal airports in this country have been cursed with politics. The shabby national practice has tossed the job of airport manager to the local political wolves, who shoved an incompetent into the spot or, if the selection was one of merit, refused freedom to anyone who sought to make a businesslike record.

As Louis R. Inwood, Kansas City Director of Airports, said so aptly before the Municipal Finance Officers Association in New York, the investment in an airport manager usually has no relation to the investment in the airport or the amount of business enterprise that should be promoted to make the airport self-sustaining.

Too often, the choice of an airport manager lies between a broken down politician and a broken down aviator. Mr. Inwood says. "Either choice is usually fatal. If the municipality decides it must have a politician it should pay enough to get a good one, because a good politician will have sense enough to employ competent assistants in order that he may retain the job. If the municipality decides to hire an aviator, they should secure one who has demonstrated his ability as an administrator and not as a bot pilot."

The speaker wisely pointed out to the municipal officers that the first and most important step in proper maintenance and operation of any airport is in picking a manager. "All else pales into insignificance."

Running an airport is a business. Aviation needs business men now above all else. The New York Port Authority's sagacious choice is an encouraging harbinger of a new deal for aviation generally, as well as for Metropolitan New York. Other cities wallowing in inefficiency, politics and red ink might take notice.

Maybe the citizens of some of them will remember, too, that the independent port authority idea is a possibility if the local political machine persists in bleeding the taxpayer via the local airport.

Maybe Pessimists Are Lazy

The pessimists seem to be enjoying the momentary slump of personal aviation. In their studied undertaker manner they are harking back to the hamburger days of '29 with that "I told you so" air.

Somehow, they forget that there are now about 100,000 aircraft registered and a monthly production of several hundred light aircraft that stands out in brilliant contrast to previous personal aviation depressions.

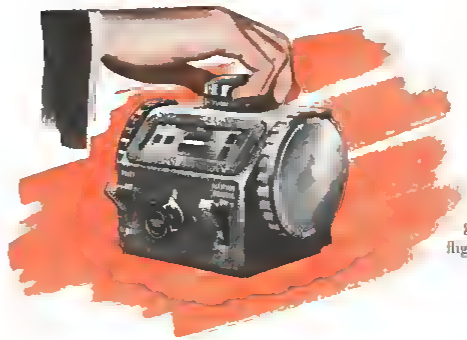
These widely circulated whines of the ne'er-do-wells need leavening by such a widely respected business leader as A. J. Weatherhead, Jr., president of The Weatherhead Co., and president of Aviation Distributors & Manufacturers Association.

Mr. Weatherhead last week voiced a long-range optimism about aviation at the ADMA summer meeting at Mackinac Island and compared aviation with the automotive industry. He said:

"Many people have stated they think the aircraft industry is reaching a saturation point both in number of private planes and flyers and in expansion of airlines. Gentlemen, this same thing was said 25 years ago about the automotive industry when we had a couple of hundred thousand cars and few roads. You know what happened. Today we have 33 million cars and thousands of roads."

The pessimists may enjoy ill health, but we prefer to listen to energetic optimists and salesmen with successful business records to back them up.

ROBERT H. WOOD



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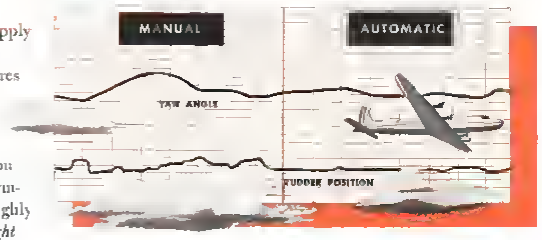

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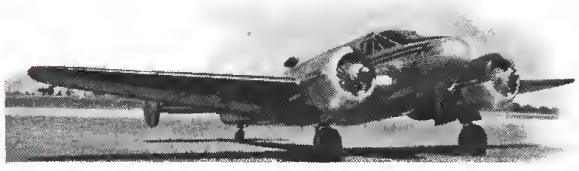

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